DOCUMENT RESUME

ED 457 832 IR 020 902

AUTHOR	McNeil, Sara, Ed.
TITLE	New Media. [SITE 2001 Section].
PUB DATE	2001-03-00
NOTE	112p.; In: Proceedings of Society for Information Technology & Teacher Education International Conference (12th, Orlando, Florida, March 5-10, 2001); see IR 020 890. Figures may contain very small and illegible font.
PUB TYPE	Collected Works - General (020) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Computer Uses in Education; *Educational Technology; Elementary Secondary Education; *Multimedia Instruction; Multimedia Materials; Postsecondary Education; Teacher Education; Technology Integration; World Wide Web
IDENTIFIERS	Learning Environments; Technology Utilization; *Web Based Instruction

ABSTRACT

This document contains the following papers on new media from the SITE (Society for Information Technology & Teacher Education) 2001 conference: "Interactive Multimedia Problem-Based Learning: Evaluating Its Use in Pre-Service Teacher Education" (Peter Albion); "Digital Audio Production for the Web" (Jeffrey W. Bauer and Marianne T. Bauer); "Teacher-Developed Video for Classroom Use: The Transition from VCR to Digital Format" (Eugene Borzov); "Tales, Trials, Triumphs, & Trends: The Evolution of a Preservice Multimedia Course" (Thomas A. Drazdowski); "WebSave - Archiving the Web for Scholarly Work" (Christian Gutl and Wilfried Lackner); "iMovie and Educators: The Right Partnership for Making Digital Movies" (Marianne Handler and others); "Creating Multimedia Web Sites in a Flash" (Nanette Hert and Ralph Cafolla); "Using CD-ROM To Guide the Development of Professional Portfolios" (Dennis M. Holt); "Multi-Agent System for Supporting Cooperative Learning" (Lafifi Yacine); "Practice on the Web: A Tool for Learning from Cases" (Carlos Laufer and others); "Middle School Education and CD ROM Technology" (Gregory R. MacKinnon and Joseph Bellefontaine); "Developing a University-Wide Digital Portfolio System for Teacher Education" (Laurie Mullen and others); "Using WebCT 3 To Create Web-Based Learning for Multiple Learning Styles" (Ann T. Musgrove and others); "Multi-Media Approaches to Teacher Continuing Professional Development: Dealing with Disruptive Pupils" (Jim O'Brien and Tony van der Kuyl); "Teachers' Perception about the Text-to-Speech Technology" (Alex C. Pan); "The Enhanced Instructional Presentation Model" (Timothy Ward Pelton and Leslee Francis Pelton); "A School-University Partnership Model for Developing Student Technology Leaders" (Melissa E. Pierson and others); "A New Approach - Situation Learning (SL)" (Maja Pivec and Hermann Mauer); "New Teachers and New Technologies" (Zoran Putnik); "Hypertext Flexibility in a Web Learning Environment To Promote Extensive Reading Activities in School Learning" (Luisa O. Santos and Paulo Dias); "Stage Struck - Technologies for the Performing Arts" (Bronwyn Stuckey and others); "Learner Self-Efficacy, Attitude, and Utilization Patterns for an Electronic Textbook" (David Unfred and Steve Crooks); "Digital Video: What Should Teachers Know?" (James E. Yao); "Changing Interpersonal Relationship between Teachers and Students Using Tuition" (Vladan Zdrakovic); "Solving Educational Problems During

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Learning Computer Visualization Applications and Raising Students' Creativity" (Vladan Zdrakvoic); and "Designing Constructivist Teaching and Learning Environments for Visual Learning" (Sara G. McNeil). Summaries of the following presentations are also included: "Improving the Use of Media in the Classroom" (Sal Marinello and Carole Polney); and "MINDS - The Learning Environment of the Future, Today" (Karl Seiler). Most papers contain references. (MES)

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NEW MEDIA

Section Editor:
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As an educator in the field of instructional technology, I am often challenged by deciding what technology skills and software should be added to the courses in our graduate program. I've found that the papers in the New Media section of the SITE Annual are good predictors of future trends in technology. This year is no exception! I've organized the papers in this section around four themes involving several aspects of multimedia: Digital Audio and Video; Research in Specific Multimedia Technologies; Multimedia Portfolio Development; Innovative Multimedia Projects, Tools, and Software; Technology Collaboration of Students and Teachers; and Course and Instructional Model Design and Development.

Digital Audio and Video

This year, the New Media section contains five papers that describe and document different methods of creating and integrating audio and video into teaching. As the technology for capturing and editing audio and video becomes simpler, the growth of these enhancements in teaching and learning environments will flourish. Many of these authors include product descriptions as well as practical guides for creating and using audio and video in educational settings.

Bauer and Bauer present a brief overview of the advantages of audio as an instructional medium. The authors also discuss information about basic audio capturing and editing, and include recommendations for processing audio for both Web and CD-ROM development. Specific information about software tools and program is also detailed.

Yao discusses the differences between traditional video and digital video and examines the current technology. Yao also includes a step-by-step guide on how to create digital video and provides educators with practical suggestions of how to create digital video economically and effectively.

Handler, Benavides, Morgan and Houghton, a group of Apple Distinguished Educators, describe an interactive session at SITE that will allow participants to develop hands-on practice with digital video cameras, PowerBooks, and iBooks. Imovie software will be demonstrated and examples of how iMovie may be integrated into both K-12 settings as well as higher education will be shown. The organization of workshops for new users will also be discussed.

Borzov examines ways to integrate digital video into a language classroom. This paper describes the process of shooting, editing, and formatting videos for students who are learning English as second language. Borzov also compares VCR/camcorders with digital cameras for shooting video and CD-ROM, DVD, and Web technology for disseminating the projects.

Pan presents the results of a study that examined the perceptions of teachers as well as other people in non-education related fields toward the use of text-to-speech technology. Synthetic speech, produced by a computer, has matured considerably over the past few years, and this study indicated that few people are aware of or use this technology. Participants were given a pre-test, and then introduced to the synthetic speech functions and activities; finally a post-test was given. The results of the study showed a statistically significant difference between pre-test and post-test scores, and most participants became engaged in developing ways of integrating text-to-speech technology into their teaching activities. Pan suggests that teachers are more likely to adopt the synthetic speech technology and integrate it into instruction if properly introduced.

Research in Specific Multimedia Technologies

Four papers highlight research conducted about specific multimedia products. Albion discusses the initial evaluation of an interactive multimedia CD-ROM called *Integrating Information Technology into Teaching* with pre-service teachers. The evaluation of the materials based on a problem-based learning framework indicates positive changes in these students' beliefs. A variety of data was

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gathered through a teaching efficacy instrument, questionnaires, and journals. This data indicated that the interactive materials using a problem-based learning framework assisted students in increasing their knowledge of the work of teaching as it relates to the use of computers and also increased their self-efficacy in teaching with computers.

Unfred and Crooks also report on a pilot study that measures learners' self-efficacy, as well as attitudes and access/utilization patterns. The study was initiated to discover areas that could impact an expanded study on factors influencing the use of electronic textbooks. Participants were given a self-efficacy questionnaire, assigned readings in an electronic textbook on CD-ROM, and participated in open-ended questions about the advantages and disadvantages of electronic textbooks. Preliminary results showed that students overwhelmingly preferred print-based textbooks to electronic textbooks, but acknowledged the fact that electronic textbooks provided advantages in color, animation, and hyperlinks.

Stuckey, Hedberg, and Lockyer describe the first phase of a research study to examine the role played by Internet-based teacher professional development in the implementation of an innovation. The innovation in this study is the software application, *StageStruck*, a educational multimedia CD-ROM designed for the performing arts. StageStruck has won many awards since it was launched in 1999, and the authors describe the development of an online community to support K-12 teachers in their classroom use of the software. The Web site offers professional development, support and resources for teachers as well as activities and projects for students. The authors will demonstrate the CD-ROM and online community in an interactive session at SITE.

Santos and Dias describe a study focused on the use of hypertext in the design of a Web-based learning environment designed to support the understanding of poetry for high school ESL students. Preliminary results show that students had a deeper involvement in suggested reading activities and a higher level of interactions with poetry when supported by a Web-based learning environment. Positive attitudes about poetry and greater feelings of participation were also noted.

Multimedia Portfolio Development

Two papers in this section focus on the development of technology tools that assists pre-service teachers in portfolio development. Holt presents a description and evaluation of a multimedia CD-ROM project, *Developing Your Professional Portfolio for Internship and Beyond*. It includes feedback from pre-service teachers who used the CD-ROM to help prepare their professional portfolios during internship, supervising professors, and educational personnel at teacher education institutions both nationally and internationally. Holt also provides an overview of professional portfolio literature.

Mullen, Bauer, and Newbold describe a collaborative process used in conceptualizing a digital portfolio requirement for all teacher education majors. The authors describe the development of a digital portfolio model by a team of university faculty with input from community and business representatives. The overall goal of the portfolio is to meet the learning and competency objectives of the teacher education program; the emphasis of the process is on reflection and to highlight the developmental process of portfolio construction. The authors also discuss portfolio structure, development process, and assessment.

Innovative Multimedia Projects, Tools, and Software

Eight papers in the New Media section report specifically on the design and development of innovative multimedia projects, tools, and software. These examples are certainly imaginative and provide exciting examples of multimedia product development.

MacKinnon and Bellefontaine describe a CD-ROM resource for a Middle School Teacher Education Course. Since the university setting for this course requires all students have a laptop computer, the use of this technology is a logical and innovative way to effectively use available resources. The authors provide and overview of CD-ROM technology and discuss the categories of educational applications and examples for each type. The approach to using the CD-ROM in one teacher education course is described and ways to integrate it are proposed.

Laufer, Blois and Choren report on an application tool for the development of case-based Web environments. This tool is described as a reusable, component-based application that can be specialized to produce custom applications. The authors provide a brief overview of the case-based learning model which is closely aligned with social constructivism and problem-based learning. The tool, called *Case-based Training Environment*, has a student area and an administrative area. It also has a stand-alone application for module authoring. Because it is primarily Web-based, students only need a browser to use the tool's functionalities. A specialist environment will be developed next where content specialists can share training modules.

O'Brien and Van Der Kuyl describe the development of a CD-ROM, *Dealing with Disruption*, for teacher professional development in dealing with disruptive students. The authors provide a brief description of the problems and challenges of dealing with students with disruptive behaviors and emotional problems in the context of the Scottish education system. The CD-ROM contains effective methods for dealing with classroom disruption and aggressive behavior with a wide range of scenarios available from a menu. The authors describe the methodology for the project and relevant development phases.

Pivec and Mauer describe the theoretical framework and development of "Situation Learning" modules. The authors give an overview of situation learning and explain the characteristics of the environment in which the learning takes place. Educational aspects of situation learning and examples of applications are also described. Pivec and Mauer also illustrate the authoring of situation learning modules and point out the levels of authoring supports.

Gutl and Lackner describe the design and development of *WebSave*, a Java-based tool that supports the research process by managing relevant information by importing bookmark files from common browser clients. The authors provide an overview of archiving and discuss the process of archiving Web resources for later retrieval. They also note problems involved with archiving and organizations involved with archiving Internet resources. Gutl and Lackner conclude by describing future implementation plans.

Yacine reports on the architecture of the system SACA (syteme d'Apprentissage Cooperetif base sur the modele d'Agent), a multi-agent system to support cooperative learning. He describes the different sets of agents, both human and artificial, which offer the possibilities for the learner to cooperate and collaborate with peers.

Hert and Cafolla present an overview of Macromedia Flash, a software program used to create multimedia Web presentations. The authors provide an overview of Flash, and describe advantages and disadvantages of developing interactive, multimedia Web sites with the software. Hart and Cafolla also discuss ways to use Flash to create presentations and animations for online delivery.

Musgrove, Knee, Rodney, and Musgrove discuss how a course authoring program, WebCT, can be used to make Web-based learning appealing and effective for a variety of individual learning styles. The authors provide an overview of learning theories as it pertains to Web-based learning and argue that professors need to adapt their course materials utilizing the same foundational learning theory concepts that are effective in live classrooms. A description of three types of WebCT tools, communication tools, content tools, and assessment tools, is also provided.

Technology Collaborations of Students and Teachers

Two papers explore the technology collaborations between students and their teachers. Zdravkovic discusses the relationship of higher education students and their instructors. He proposes different approaches and techniques to encourage better student-teacher relationships and foster learning.

Pierson, Booth, McNeil, and Robin describe the development of a school-university partnership composed of three groups: student "consultants," teacher "clients," and university "experts." The authors describe the yearlong project that is designed to develop a cadre of technologically and pedagogically skilled middle-school students who can assist the technology development of their teachers. Activities, challenges, and achievements of the two-year project were also included.

Course and Instructional Model Design and Development

Five papers discuss the design and development of courses in new media or instructional models that facilitate construction of knowledge in a less formal sense. Drazdowski describes the evolution of a media design course into a multimedia design course over the past five years. He compares the physical changes in computers, presentation hardware, and peripherals available for the course, and he includes ideas and recommendations for other teacher educators seeking such changes in the preservice curriculum.

Zdravkovic discusses teaching environments for computer visualization, especially in the areas of 3-D modeling, animation and special effects. He proposes that a different learning paradigm is needed with a more flexible approach that incorporates project-based learning techniques. The task of combining theoretical knowledge with production capabilities is difficult, and Zdravkovic describes several strategies for developing the required competencies and assessing student progress.

Putnik proposes a learning model that allows teachers to actively communicate with others electronically, participate in online discussions, use Web-based resources, and contribute to a shared body of knowledge. He proposes an outline for the course that includes characteristic elements about interactions, collaboration, and skills. Putnik notes that it is important for interactivity to move beyond short moments between student and teacher and to invoke a feeling of togetherness between students, teachers, and the instructional materials.

Pelton and Pelton describe the Enhanced Instructional Presentation (EIP) model for the development of educational hybrid linear/hypermedia presentations. The EIP model is a hybrid, combining a linear presentation with playback control and a synchronized, hyperlinked network of supplementary linear and hypermedia segments. The authors provide an overview of the EIP model and describe future activities for developing a tool to support construction of modules.

McNeil describes the design of a graduate course in visual learning based on constructivist teaching principles. The conceptual framework is described, and guidelines and examples of each project are presented. Innovative strategies that contribute to a constructivist teaching and learning environment are discussed. Student and instructor comments are also shared.

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Interactive Multimedia Problem-Based Learning: Evaluating its Use in Pre-Service Teacher Education

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Abstract: Interactive multimedia using problem-based learning as a design framework (IMM-PBL) has been proposed as a method for influencing teachers' beliefs about integrating computers in their teaching. Initial evaluation of IMM-PBL materials with pre-service teachers found evidence of changes in beliefs, including a statistically significant increase in self-efficacy for teaching with computers among participants who recorded initially low values on the same measure.

In a previous paper (Albion 1999b) it was argued that teachers' self-efficacy beliefs about teaching with computers are an important influence upon their tendency to integrate computers into their teaching. Based on a consideration of self-efficacy theory, it has been proposed that interactive multimedia using problem-based learning as a design framework (IMM-PBL) might be effective for increasing teachers' self-efficacy beliefs about using computers in their teaching through exposure to examples of appropriate practice (Albion 2000; Albion & Gibson 1998). The underlying theory of IMM-PBL (Albion & Gibson 1998) and aspects of the development (Albion 1999a) of a CD-ROM using the design framework have been described elsewhere. This paper reports the results of initial evaluation of the completed multimedia package, *Integrating Information Technology into Teaching* (Gibson & Albion 1999), in use with a class of pre-service teacher education students.

Evaluation Methods

A pretest-posttest design was used. The experimental group (N = 22) comprised students who had self-selected into a class in which the IMM-PBL materials were used as the basis of two-hour sessions attended over a five week period. The control group (N = 27) comprised an equivalent group of students studying alternative electives. The key research question sought to determine the effects of IMM-PBL materials on pre-service teachers' self-efficacy beliefs in respect of teaching with computers. This variable was measured using the Microcomputer Utilization in Teaching Efficacy Beliefs Instrument (MUTEBI) (Enochs, Riggs, & Ellis 1993). Both the experimental and control groups completed the MUTEBI as part of a battery of instruments prior to and immediately following the five-week period in which the experimental group used the IMM-PBL materials.

Additional research questions sought to describe users' reactions to the content and presentation of the materials and to determine the effect of the materials on users' perceptions of their knowledge and understanding of using computers in teaching. Data relevant to these questions were gathered from the experimental group using a questionnaire which included both Likert scale and open-ended, journals maintained while working with the materials and interviews with a small sample of participants (Albion 2000).

Results

Users responded positively to both the content and presentation of the IMM-PBL materials. They agreed that the four problems framed in the materials were relevant to their future work as teachers and cited new insights about various aspects of teaching obtained as a result of working with the materials. The element which attracted most favorable comment was the digitized video, especially that which presented interviews with teachers. Although all participants used the materials under equivalent conditions in a computer laboratory, patterns of use varied. Some worked systematically through the four problems, while others preferred to browse the resources, especially the video segments. This variation in patterns of use resulted in different outcomes for different users.

Increases in self-efficacy for teaching with computers (SE) were observed for some participants. Participants were partitioned according to their initial levels of SE (high or low) and the changes for each group were examined (Fig. 1). A statistically significant increase in SE ($t = 2.71$, $df = 23$, $p = .013$) was recorded for participants who had recorded initially low values of SE.

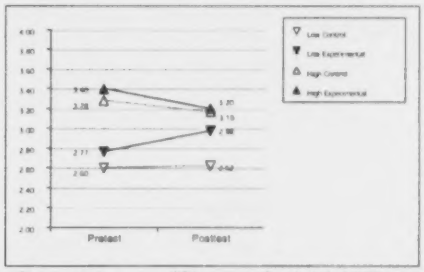

Figure 1: Pretest & posttest mean SE scores by initial SE group (Albion 2000)

Statements made in open-ended responses, journals and interviews indicated that some students had experienced significant conceptual change as a result of working with the IMM-PBL materials. These data supported the conclusion that the materials were effective in changing the beliefs of participants.

Conclusions

There is evidence that the use of the IMM-PBL materials assisted students to increase their knowledge of the work of teaching especially as it relates to the use of computers. There were increases in self-efficacy for the use of computer technologies and for teaching with computers. Technical difficulties experienced in the trial and the variations in patterns of use may have restricted the effect of the materials but the available evidence suggests that the presentation and content were appropriate and that further investigation of IMM-PBL and its use in teacher education would be worthwhile.

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Digital Audio Production for the Web

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Abstract: Examine most web-based courses and you will find that very few of them make use of audio support for instruction. Quality audio on the web once meant large files and clogged bandwidth. However, new data reduction formats such as MP3 make it possible to include quality audio support for instructional materials. Most computers come equipped with the necessary hardware and software for web developers to use their existing equipment to produce good quality audio programming. This paper presents a brief overview of the advantages of audio as an instructional medium. Information regarding basic audio capturing and editing on a typical PC is presented, followed by recommendations for processing audio for web and CD-ROM development. Samples of the author's work can be found at www.mp3.com/jeffreybauer.

Research in the Effects of Audio on Learning

Audio is an important instructional medium that can significantly enhance web and multimedia based learning. Research in this area reveals several benefits. Allen (1973) has shown that audio can be skillfully included to direct learner attention to particular elements of an instructional message. Just as animation can be used on the web to gain attention, audio can also be included to help the learner focus attention on particular elements such as the starting point, or help links of a web site. Severin (1967) has also shown that multi-channel communications enhance learning because of the impact of the summation of cues between channels. Audio also provides an opportunity for the learner to "relate" to the narrator (Hoban & van Ormer, 1950). Verbal simplification in media commentaries has been shown to increase teaching effectiveness (Travers, 1967).

In the area of music, Seidman (1981) concluded that musical accompaniment enhances the emotional impact of a media production. He found that music could also provide continuity by tying together scenes in a script. Thus, a case can be made supporting of the use of music as well as narration in web based training environments.

Basic Audio Capturing on a Typical PC

Audio Inputs and Microphones

Most current computer systems, both desktop and laptop varieties come standard with nearly everything needed to capture and edit good quality audio files for web and multimedia instructional purposes. Many computers even come equipped with built in microphones or external microphones that plug into the audio in port on the back of the computer. How do you know whether you have such an option? Simply examine the back of your computer and see if there is an audio in receptacle or an input receptacle with a picture of a microphone associated with it. If there is, you have the basic hardware necessary to capture audio.

You may need to purchase an external microphone in order to capture sound on your computer. A medium quality dynamic microphone ($30-$100) by a reputable manufacturer such as Shure, AKG, Audio Technica, or Realistic should be adequate for producing good quality instructional audio. Radio Shack carries the adaptors

necessary to convert the cable on the microphone to the proper format for your audio card on your computer. Usually, computers accept 1/8" stereo mini plugs. Computers with more sophisticated A/V capabilities, such as PowerMac G3s and G4s, accept a pair of RCA cables. Again, consult with someone who is familiar with audio adaptors in order to get the proper connectors.

Audio Capturing Software

The only other ingredient necessary for digital audio production is a program that will allow you to capture the signal from the microphone to your hard disk. Again, many computers come standard with a utility that allows you to do this. For example, the current Macintosh Operating Systems, 8.6, 9.0, 9.04, and X, include a program called *Simple Sound* which allows you to capture audio either from the built in microphone or the sound input receptacle.

Figure 1. SimpleSound recording interface for the Macintosh.

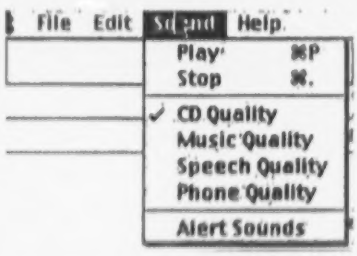

Figure 2. Quality level choices on SimpleSound. Higher quality such "CD" and "Music" will create larger, better sounding files.

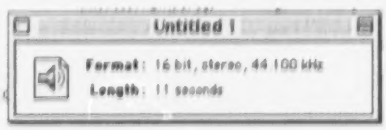

Figure 3. SimpleSound Dialog box providing technical details about the recorded sound clip.

Programs such as Adobe Premiere, Digidesign ProTools, CakeWalk Home Studio 8, Steinberg Cubase and many others have more sophisticated audio capturing and editing capabilities. While these programs are intended for more advanced applications, all are reasonably priced and most have both Mac and PC versions. It is beyond the scope of this article to explain the intricacies of these programs; suffice it to say that all of them offer more exacting editing capabilities. They also allow the user to add special effects such as echo, chorusing, audio compression (not to be confused with file compression), and hundreds of other options. All of the programs listed above allow multitrack recording and editing, meaning that you can add multiple layers of audio. For example, using ProTools, you might want to start by recording an instructional narration using a microphone hooked into the computer. Later, you might want to disconnect the mic and hook a cassette tape player to the audio input and capture some background music. This music can be put on its own separate track so that it can be edited separately from the narration track. Gain levels and stereo panning (left/right soundfield placement) are additional typical features. High end programs such as ProTools and Cubase offer different ways

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to view files such as an edit view which graphically displays the audio file, and mix view which looks like a typical analog mixer that audio engineers are sure to recognize. A free version of ProTools for either the PC or the Mac can be found at www.digidesign.com.

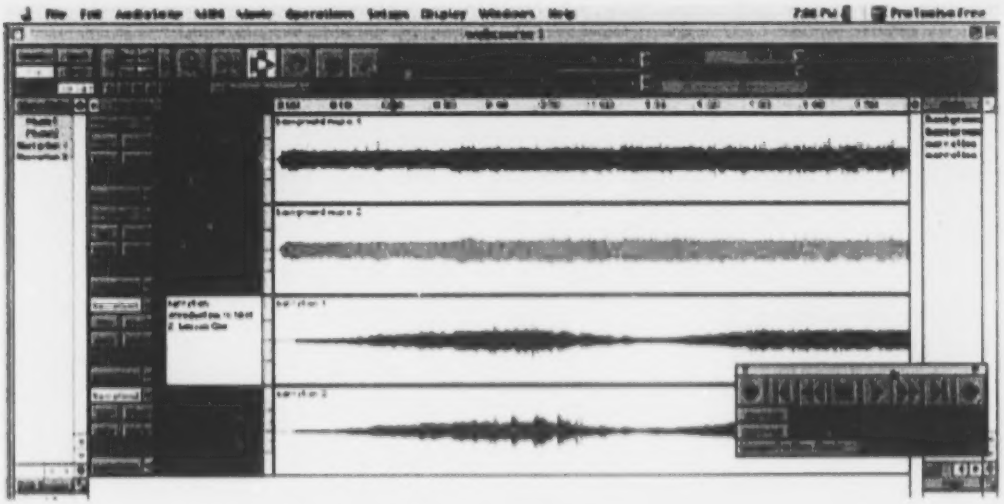

Figure 4. ProTools Edit View offers many professional editing features. A free version is available at www.digidesign.com.

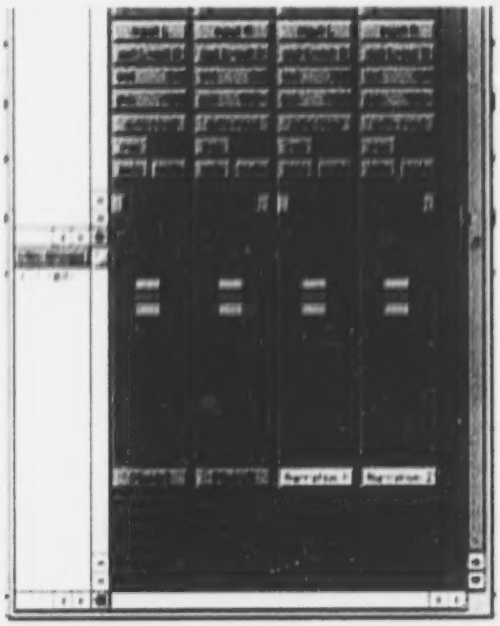

Figure 5. ProTools Mix Window allows real time editing of sound levels and special effects.

Selecting a Quality Level

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When capturing and editing audio that will eventually end up on the web or on a multimedia CD-ROM, it is best to start with the best quality possible. This means that the initial file sizes will be quite large. Later the audio file will be converted to a more compact format such as .wav or .mp3. Data reduction and compression works best when the raw product is of the best possible quality. It is a good idea to optimize hard drive space using Norton Speed Disk or another similar defragmenting program before you begin capturing audio. Your computer will run much more smoothly, and the chance of a glitch will be greatly reduced. Set the audio capture preferences to CD Quality which is a capture rate of 16 bits at 44100 kHz. To save hard disk space, you can select mono instead of stereo if it is available. This is the raw file. Typically this file occupies about 10 MB of hard drive space per minute. A five minute piece of instructional audio will occupy about 50 MB on your hard drive, but remember that this file will be compressed later.

Processing the Captured Audio Files

Helpful Tools

Two tools that can help improve the quality of your audio recordings are audio compressors (not to be confused with data compression), and audio mastering software. Audio compressors smooth out the dynamic range of the sound that you are recording. Basically, compression boosts the quiet parts of the audio program and cuts or limits the loud parts of the audio program. Inexpensive compressors such as the Alesis Nanocompressor (about $100) are fully adjustable so that you can determine how much the signal is squashed. A simple setup would be to plug the microphone directly into the input on the compressor, and then run a line from the output of the compressor to the audio input of the computer. Compressors are the single most useful tool to improving the sound of a recorded program. Their effects are deceptively subtle, but when the audio material is converted to a format that will work well on the web or in multimedia, it is essential that the audio be without overly soft and loud extremes.

Figure 6. Alesis NanoCompressor. An essential tool for improving audio quality.

Another helpful tool is mastering software such as Berkley Integrated Audio Systems PEAK (about $40 for the LE version). Mastering software is useful if you have several audio clips that are going to be used on your instructional website or multimedia program. This software allows you to normalize the various individual files so that they are all of approximately the same loudness. It also allows you to cut and paste pieces of audio or fade in or out on a track. Mastering is the second to the last step in preparing audio for the web.

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Figure 7. Mastering software such as BIAS Peak can help you control the consistency of your audio files on your website or multimedia CD.

Converting the Audio File for the Web or Multimedia Applications

The final step in the production process is to convert the edited and mastered files to a format that will work well on the web or in multimedia software. The format that offers the best compromise between file size and quality level is MP3. The raw audio files that you captured and edited which occupy about 10 MB of hard drive space per minute of audio can easily be reduced by a factor of 10 without significant deterioration of quality. Data reduction of up to 20:1 can yield very usable results in an MP3 format, and the audio can be formatted on your website for either streaming or downloading. Your users will need to download a free MP3 player (www.mp3.com) in order to playback your audio files. The original uncompressed 10 MB per minute file is reduced to 1 MB per minute for good quality or 500 KB per minute for fair quality—good enough for narration. Using an MP3 program such as SoundJam, converting audio files to the MP3 format is as easy as dragging and dropping to a conversion window. The user then chooses the quality (bit rate, stereo/mono, sampling rate) that will work for the instructional program. I usually make several conversions of the same file and test them to see which settings give me acceptable quality while trying to keep the file size manageable. You can check my results at www.mp3.com/.

Real Audio streaming formats are also very good for the web. Various file formats (.wav files, Quicktime, and others) can be processed as Real streaming audio during the mastering stage. It is simply a matter of performing a "Save as…" and selecting the desired format. You should experiment with different file types and compression settings to see what works best for you.

Final Thoughts

Using your PC to produce good quality audio support for your web based courses or multimedia CDs is not a difficult endeavor. Research supports the use of multimodal teaching materials, and audio can bring life and personality to an otherwise bland web course. Three major steps were discussed: (a) capturing the audio, (b) processing and editing, and (c) converting the audio to the appropriate file format. Data reduction technology has advanced to the point where high quality audio takes up very little hard drive space and bandwidth.

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Figure 8. The author prepares audio tracks on his Mac G3 using Digidesign's ProTools. You can hear a sample of his work at www.mp3.com/jeffreybauer.

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Teacher-Developed Video for Classroom Use: The Transition from VCR to Digital Format

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Abstract: This presentation will examine the ways to integrate digital video technology into a language classroom. The process of shooting, editing and formatting educational video films for students learning English as a second language will be discussed. The focus will be on a comparative analysis of traditional VCR/Camcorder technology versus digital cameras and modern CD-ROM/DVD/Web technology for disseminating the resulting video. The examples of effective techniques and original QuickTime movie clips will be included in the presentation.

Introduction

Educational video has become an essential part of instructional technologies, but its integration into curriculum is often limited by utilizing commercial films, rather than self-made productions. Digitized video is often considered too raw for effective use in more than a very short clip, while the picture is quite small (only by 2 in. by 2 in. or 4 in. by 4 in.) and may be jerky and unclear, especially if blown up to a large size (Healey, 1999,p.131).

Still, digitized video holds promise for the future. Students, who will make presentations in the scientific, business or academic realm need to know how to look as well as sound good in a presentation, and video offers them a full picture of what they do well and what they need to improve (Healey, 1999,p.132).

Teachers, developing educational films for classroom usages may take advantage of analog and digital video technologies, depending on the resources and tools available. The video I produced for English as a Second Language classes may represent both a traditional approach, focused on camcorder /VCR technology, and a more progressive one, utilizing advanced computer-assisted technologies, based on digital audio and video processing.

Analog Video Production

The equipment necessary to produce an analog video film may consist of a camcorder, a VCR with editing functions, a tape-recorder or a CD - player, a microphone and a TV. Once all the original footages are specified and chosen for a film, a long and time-consuming process of editing begins. All selected fragments are exported step-by-step from the source tape to the target one. This manual way of putting pieces together may not guarantee a seamless video picture. Some unfortunate noise bars and unexpected frames may show up at transition areas, making a producer start a new round of attempts to eleminate these flaws.

Setting a precise duration of a footage may also be a hard thing to do, because a synchronous manipulation of a "start" button on a camcorder and a "record" button on a VCR may appear quite problematic in the beginning, but the teacher is sure to improve after some practice.

Audio dubbing is the next challenge for a producer after the video is done. The most complicated task is to strike a balance between a background voice/music track and a foreground narration. My experience proved to be successful after I managed to acquire some accuracy in handling a CD-player and a microphone switch at the same time. Some special care should be taken about a distance between a microphone and a background sound source. This may be crucial for the narration to dominate over musical tracks.

Any video production without titles or script messages cannot be considered complete. Some analog camcorders (JVC RG-AX48) have a character generator, which is able to store up to 18 letters and superimpose it over the scene being shot. The teacher may actually use a different and a very simple way to entitle the film by making a close-up picture of a text printed on a sheet of paper.

This approach in constructing analog video films may challenge teacher's skills and demand a lot of industry and patience, but it is quite good and practical particularly for those circumstances, when the facilities are limited and the resources are scarce. Teachers with absolutely no computer literacy may practice this type of movie – making, since no software is meant to be used in this process.

Digital Video Production.

Most digital semi-professional camcorders on the market today use MiniDV format, which meet the demands of extremely high-quality audio and video production. DV differs from analog in that it stores all sound and image information in digital form and enables to copy video between a DV camcorder and a computer with no loss of quality. So every time when video is captured, edited and exported back to tape, the quality of the original footage is retained. This is not so with analog video, where electronic signal is likely to lose strength, when the video is copied from one medium to another.

Digital audio sound is also a perfect match to digital quality images. Most MiniDV camcorders offer two recording modes: two - channel (16 - bit linear, 48 kHz sampling) for optimum quality and four - channel (12 – bit non - linear, 32 kHz sampling) for stereo dubbing.

The process of digital editing is entirely computer-based and the teacher has a number of options to choose between quite easy and friendly software, like iMovie or Avid Cinema and more professional, like Ulead Video Studio and Adobe Premiere. Some manufacturers of digital camcorders (JVC) may include editing software (JLIP Video Capture, JLIP Video Producer) into a purchase package and provide a lot of useful instructions online (www.jvc-victor.co.jp/english/cyber/us/software/index.html).

All the problems and challenges, related to analog video production, can be easily solved by digital technologies. Elaborate applications and tools may ensure perfect selecting, cutting, pasting, random assemble editing, adding scene transitions, audio dubbing, importing and exporting sound and images, creating still-images, renaming video clips.

But perhaps the most dramatic advantage of a digital format lies in the ways to disseminate the resulting video. The iMovie tools I used to produce my educational video, made it possible to convert the footages into a QuickTime format movie, ready for different compression strategies and delivery mediums, including videotape, CD-ROM, DVD and the Internet.

The Web dissemination is an exciting opportunity to include personal video into global distant learning schemes. A movie can be posed to a home page site to have people download it. In this case the film should be short enough, otherwise the downloads may be too lengthy for a waiting viewer to enjoy. A compression used for publishing my Quick Time movie in the Internet gave me a 1/8 – screen image (240 x 180 pixels), 12 frames per second and a stereo sound 22 kHz. JPEG compression with Avid Cinema may allow exporting a Quick Time movie to a compositing program, such as Adobe Premiere After Effects with even more dynamic resolution:

- ¼ screen (320 x 240 pixels NTSC or 397 x 288 pixels PAL)
- CD - quality stereo sound (44 kHz, 16-bit)
- 29,97 frames per second NTSC or 25 frames per second PAL (same as Television)
- 55 MB disk space per minute of video

Quick Time movie may be streamed online, so that people can see the resulting media play right away on the screens of their computers, using Quick Time Player. One more advantage of direct streaming is that the video files are not limited to reasonable sizes, as opposed to HTTP downloads. Long feature films, that would make multi - gigabyte files, can stream easily and rapidly.

It is also important to know, that streaming makes it possible to gain control over the distribution and copyright issues. When somebody tries to save the incoming media, the actual data is never copied, but is simply displayed as it arrives by the Quick Time plug - in and in Quick Time player. So the audience may have access to the Quick Time movie's URL, rather than have a chance to copy it on a hard disk.

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Tales, Trials, Triumphs, and Trends: The Evolution of a Preservice Multimedia Course

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Abstract: With the introduction of our new multimedia computer lab in the Spring of 1996 (Drazdowski, 1997), our preservice teacher education program at King's College began the transition of its traditional "Media Design" course to one in "Multimedia Design." This paper will discuss the evolution of this course over the past five years, including ideas and recommendations for other teacher educators seeking such changes in their preservice curriculum.

Tales

First, some tales. Probably one of the most dramatic developments in the evolution of our multimedia course over the past five years is in the rapid advancements in hardware, software, and Internet resources. Where our initial multimedia lab consisted of Power Mac 5200/75 LC's, our upgraded machines are Apple G3 computers with 450 megahertz processors, 12 gb hard drives and 256 mb of memory connected to Pioneer laser disc players with their own separate Sony color video monitors. The built in Zip drives in the new towers have provided tremendous flexibility for storing and sharing large files, projects, and QuickTime movies. The current data projection system is three times as bright as the old LCD panel, eliminating the need to totally darken the room. The *HyperStudio* program is now version 4.0, which offers many improvements, especially in the areas of animation, special effects, enhanced transitions, and printable storyboards. The new scanner is USB compatible, has higher resolution dpi and 42-bit color, and has trays to scan slides, pictures, and transparencies. A Sony Mavica digital camera has replaced the old Apple QuickTake 150, and its built in disk drive has eliminated the need to download pictures through a serial port and then use cumbersome software. Our video camera for making QuickTime movies is now digital instead of analog, and can be connected and controlled by the computer through FireWire technology. Third party vendors have developed a large variety of texts (see Drazdowski, 1996) and resources (see Drazdowski, 1998) such as *Month by Month for HyperStudio* and *HyperStudio Project Resource Kit*, and other vendors have designed complimentary software packages, such *as Sound Companion for HyperStudio*, *Morph Pro 2.5* , and Apple's *iMovie 2* that can enhance student projects. And the Internet has exploded over the past five years with sites that serve as resources for text, pictures (see Picts4Learning at http://pics.tech4learning.com), clip art, video clips, sound effects, and music tracks. Students today are literally overwhelmed with available multimedia components. Finally, the teacher station now has a recordable/rewritable CD-ROM, so that all projects can be easily copied, saved, and distributed to students for use in their student teaching assignments. The course continues to model constructivist and cooperative learning theories, and serves to anchor our "Professional Semester" requirements. Education department faculty members are making an earnest effort to model effective technology use in their own teaching, and I encourage them, as Brown (2000) has pointed out, to go first for the "low-hanging fruit," and then decide if it's worth the effort to climb higher in the tree. Faculty also continue to take advantage of professional development opportunities to enhance their own technology skills. We have made significant progress, and hopefully our department will continue to receive the administrative and financial support needed to accomplish and sustain all of our technology infusion plans (Drazdowski, Holodick, & Scappaticci, 1998).

Trials

The literature is replete with examples of the barriers educators are confronted with when attempting to integrate instructional technology into the curriculum: lack of training, insufficient time to develop instructional innovations, enlarged class sizes, lack of equipment and technical support, resistance from faculty and technology anxiety, the need to revitalize faculty attitudes toward teaching, underfunding and lack of sustained administrative support, little system-wide planning and vision for technology use, and other simultaneous innovations in pedagogy, curriculum, assessment, and school organization not being coupled to the use of instructional technology (Albright, 1996; Dede, 1998; Lee & Johnson, 1998; Middleton, Flores, & Knaupp, 1997; Pink, 1989; Selwyn, 1999; Tapscot, 1999). Our program continues to face all of these challenges in various degrees which often impedes the pace of the progress that we desire. Like all educators who wear a variety of hats, I occasionally suffer from what Fullan (1996) has identified as "overload and fragmentation," which can combine to reduce educators' motivation for working on reform. But one of our biggest barriers, which the OTA Report (U. S. Congress,1995) also cited, continues to be the lack of technology rich field settings for our students' practicum experiences. As I read my students' journal entries that are required as part of the multimedia course, many write that they are disheartened when they visit their school sites to find that little technology will be available for their use in student teaching, and much of what is available is old and obsolete. Some local districts have made a few technology strides over the past five years, but many continue to struggle with weak property tax bases that are their foundation for funding and are also facing major financial concerns with the burden of structurally upgrading or replacing their old school buildings. Our student teachers write that their students often do not even have access to their own textbooks, never mind advanced technologies. Without a major infusion of money from the state and the federal level to address these serious concerns, many of our school districts will continue to limp along the road to the information super highway.

Triumphs

Various authors in the educational technology field have noted that computer use in schools is framed by the beliefs of users about computers and schooling (Bigum, 1998), that computer use often requires changes in a teacher's educational ideologies (Robinson, 1995), and that teacher computer use often hinges on their computer experiences (Hadley & Sheingold, 1993). As Michael Dertouzos, a columnist for *Technology Review*, writes:

> Learning may critically depend on what humans, not computers, do best: Lighting a fire in the student's heart, role modeling, and nurturing may contribute more to learning than the neatest hyper-linked courseware. (1998, p.20)

Therefore I feel that one of most beneficial aspects of providing preservice teachers with a required course in multimedia design is to provide teacher educators with the opportunity to model what Jonassen, Peck, and Wilson (1999) refer to as "meaningful learning," that is using technologies "to engage students in active, constructive, intentional, authentic, and cooperative learning" (p.7), and to show students how to use technologies as "mindtools" (Jonassen, 1996) or as an intellectual toolbox that can be used to engage them in critical thinking about what they are studying. Instructor modeling of these concepts is critical, for we are all aware of the old but true adage that "teachers teach as they have been taught."

As I have read the students' journals over the past five years, I am struck by a continuing pattern of student thought: usually initial anxiety as they enter the course, followed by growing confidence as they master the authoring program and become more comfortable with the various pieces of technology equipment, to finally a great sense of accomplishment as they complete their projects and an endless list of possibilities for technology integration into their own teaching curriculum. We now have available on CD-ROM some 250 educational stacks prepared for a variety of grade levels, topics, and content areas that

students can utilize in their own teaching assignments, and our department continues to provide two laptops and portable video projectors for student use in their field settings if necessary. Graduates continue to contact me with exciting stories of their technology use with their own students and their inservice work with veteran teachers, and several have become technology teachers and computer coordinators for their districts, all doing their best to act as "change agents" (Strudler, 1991) for their learning organizations. As for me as instructor, I couldn't agree more with the CEO Forum School Technology and Readiness Report (1999) that stated, "technology, applied well, can enhance and reinvigorate education, making schools richer and more exciting interactive communities of learning for students and teachers alike (p.6)."

Trends

The introduction to the report entitled *Technology and the New Professional Teacher – Preparing for the 21st Century Classroom* (NCATE, 1997) clearly states the technology challenge facing teacher education programs:

> The nation's teacher education institutions must bridge the teaching and learning technology gap between where we are and where we need to be. Although progress has been made and exemplary practices exist, recent research indicates most teacher education programs have a long way to go. Teacher education institutions must prepare their students to teach in tomorrow's classrooms. Rather than wait to see what tomorrow's classroom will be like, they must experiment with the effective application of computer technology for teaching and learning in their own campus practice. Today's teacher candidates will teach tomorrow as they are taught today (pp.2-3).

Some other recent reports support the concept that teacher education programs have a long way to go in technology preparation. For example, the National Center for Education Statistics (U. S. Department of Education, 1999) found that only 20 percent of teachers reported feeling well prepared to integrate educational technology into classroom instruction. The Milken Exchange on Education Technology (1999) and the CEO Forum School Technology and Readiness Report (1999) both conclude that, in general, teacher-training programs do not provide future teachers with the kinds of experiences necessary to prepare them to use technology effectively in their classroom. Recently the International Society for Technology in Education (ISTA, 2000) and NCATE have specified the technology skills that teachers are expected to have as they enter the teaching profession. The state of Pennsylvania, where my college resides, is currently reviewing new Academic Standards for Science and Technology (Pennsylvania Department of Education, 2000), which will also effect what preservice teachers need to know and demonstrated before receiving initial teacher certification. Hopefully these technology standards will serve as a catalyst as well as a blueprint for change in preservice technology instruction. Schools of education must integrate technology into the entire preservice teacher curriculum, faculty must effectively model technology integration and new pedagogic methods in their own courses, and education programs must provide preservice teachers with meaningful field experiences in technology rich settings if we are to meet these new standards. To paraphrase the poet, we in teacher education "have promises to keep, and miles to go before we sleep, and miles to go before we sleep."

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WebSave - Archiving the Web for Scholar Work

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Abstract: The WWW provides a variety of scholar information, like theses, studies, etc, which may be valuable basics for further and new scholarly work. Referred information of the WWW has to be archived (at the time of writing) for further usage because Internet resources could be changed. The working prototype *WebSave* - described in this paper - support users in their research process. The advanced and novel system manages relevant information of the WWW by importing bookmark files from common browser clients. The system allows adding a wide range of local metadata, storing the referred resources and generates a literature list. Furthermore, it is capable of interacting with other services like preparation for building a background library on CD ROM, building a document archive using *Hyperwave*, building a scholar dynamic Web library by quality metadata exchange to *xFIND*.

Introduction

More and more information, citations and conclusions in scholar works refer to information on the World Wide Web (WWW). This statement may be confirmed e.g. by observations of scholar works and theses at the Institute for Information processing and Computer supported new Media (IICM) at Graz University of Technology. This applies also to publications and reports of conferences and journals. As a matter of fact the WWW is a large – most likely the largest - information repository. However, there is also the serious problem of changing and moving documents on the Internet. It is well documented that the WWW is a highly dynamic Information repository and a perfect media for a fast publishing process. To get revisable Internet references it is necessary to archive and provide the referred information of the WWW for further usage. This may be backed by different basic studies (archiving information from the Internet) by organisations like National Libraries and further institutions. The consideration results in specific requirements within the archiving process of Internet resources for scientific papers and scholarly works. Therefore, the authors of this paper emphasise that it is necessary to suggest possibilities on assistance for users and institutions within their scholar work to archive cited information from the WWW.

The structure of the remaining chapters is given as follows. The first part of the paper, a survey, discusses in brief the archiving process in a historic view as well as the archiving process of electronic documents in general. The second part describes the prototype implementation of the advanced and novel WebSave tool to archive and administrate Internet resources within the process of scholar works, which is based on the conclusions on the first part of the paper.

The Archiving Process of Web Resources

Basically, the motivation for archiving Web pages is to represent snapshots of society for later retrieval and to preserve knowledge for mankind. Therefore, archiving is a long-term process that never ends. Today, search robots or offline browsing tools are used to collect Web sites and to build local archives. However, such tools do not support the process and the requirements of scholarly work. New interactive systems (e.g. chat facilities) require new efforts to gather such documents. It is quite obvious that the archiving process of objects in history is quite different from the requirements on archiving Web pages today, which is discussed as follows.

Archiving from a Historical Perspective

In history, since about 2500 B. C. archives can be found. *Archiving* is the process of collecting and managing objects with historical background. In general these documents are not prepared for publication (e.g. official documents) and are called dead documents (Weiß 2000), because these documents or objects never change. The term *archiving* describes also the classification of documents by formal methods (e.g. grouping, indexing, etc.). Indexing parameters can be subjects, locations and authors. Result of classification tends to an index summary in a printed and / or electronic version.

Tree different types of the archiving process can be identified: *Archives* stores only important records or documents, which are not publicized but worthwhile to preserve for mankind; *Libraries* archives published (reviewed) documents; *Museums* archive artistic and scientific documents, images, objects, etc. The storage media and the process of archiving are basically in the analogue sphere (Alscher 1999).

Today, the motivation for archiving is the same, but new technologies (for objects to be archived and within the archiving process) have to be regarded. It is to be mentioned that e.g. on the Internet nearly everyone can publish without any quality control, but also huge valuable amounts of research work and technical reports can be discovered for further scholarly work. A deeper discussion of electronic archiving and detected problems are discussed in the following sections.

Electronic Archiving of Information

The term *electronic archiving* (Weiß 2000) is similar to the concept of imaging (the process of digitizing, storage in databases and retrieval). In general, electronic archiving may be the first step to a digital office. Considering the electronic archiving process, it is subdivided into data storage, data retrieval, and data migration. The process of archiving depends on the characteristics of the document (VSA 2000), which can be categorized in different ways: readability - human and / or machine-readable; type of storage media; document type (text, images, videos, music, etc.).

As a special scope, electronic archiving or imaging can also be understood as the preparatory operations to build Web pages and Web archives. That means the Internet can be used to archive valuable information and enables access also by the Internet. On the other hand, information available on the Internet should be archived, which can also be performed by an Internet archive.

It is well documented that the Internet is a huge - maybe the biggest - knowledge repository of mankind. The Internet offers a cheap and simple way to publish documents without nearly any restrictions. Because of this, the Internet is a disordered, decentralized and mostly not censored worldwide library. It is well known that humans have produced more information since 1945 as in the whole history before. The increase of knowledge is estimated to be exponential. Therefore Internet archives also have to process increasing amounts of data.

Following the idea of archiving (process of collecting and managing), different types of already existing Web archiving methods can be identified like: (1) link collections (e.g. annotated link lists), (2) search engines (e.g. full-text index and document cache), (3) data collections (e.g. ftp) and finally (4) Web archives. All these types provide similar viewing techniques and hierarchical data structures. One advantage of Web archiving methods is the ability of systematic access, which can be performed simultaneously and from different places. Considering the development of mobile communication, this will be increasingly important. The storage is cost effective in relation to the quantity of data. The information can be requested in *real time*. However, one of the main disadvantages is the dynamics and malleability of Internet resources. In addition, information depends on the context, which means that a bit sequence can be interpreted in different ways (digital codes). It is absolutely necessary to use a tool (computer, PDA, etc.) reading and understanding a digital code. Thus, the representation the information depends on the used hardware and software. Because of changing technology over the years, data must be copied to other storage media keeping the information safe (migration). Furthermore, today common transformation rates cause problems related to media objects (video, sound, etc.) performed by remote requests. To sum up, the demands on future archiving systems consist of standardized retrieval interfaces, standardized storage formats and specially standardized document formats. Detected Problems, as followed, has to be considered.

Detected Problems

Some problems related to electronic archiving (focused on Web archives) can be identified as follows:

Information overflow and duplicates: The digitizing of pictures, sound and music data, videos and films produce a huge amount of information. Most of this information should be archived at least for years or even forever. There exist many copies of the same documents at different places.

Information malleability: Information of electronic documents, especially Web resources, could be highly dynamic, and location of documents could be changed or even be deleted. E.g. the average live span of a Web page is about 75 days (Kahle 1996).

Migration and Lifetime of Documents: The capacity of storage media has been increased in the last ten years about hundred times. The transfer rate increases only four times in the same period (Phelps et all. 2000). The result is that the entire set of data cannot be copied in acceptable time. Migration is the process of storing documents permanently. This includes periodical copying into new system environments. Thus, metadata has to be transferred and in general the documents must be converted into a new document format. Parts of information may be lost (VSA 2000).

Access Rights: When people buy a printed journal, they never lose the access right and the content cannot be changed. Online journals can change ownership and therefore the copyright could be changed and the access right will be lost. No one knows how long and who should manage user data concerning access rights.

Related Work and Concluded Requirements

The following paragraphs are focusing especially on archiving Internet resources. Few organizations can be identified, which archive country-specific information. The mentors of these projects are national libraries and governments. They define specific guidelines about registration and documents that have to be archived. Furthermore, single initiatives of public or commercial organizations can also be identified, which effort to archive the entire Internet. A selection of examples is discussed as follows.

EPPP (Electronic Publication Pilot Project) is a project of the National Library of Canada. It has been founded in the time of June 1994 to July 1995. They decided to use the WWW as the primary gateway to access electronic publications. Collection guidelines define that archived documents must be published in Canada, sponsored or produced by a Canadian company (see EPPP 1996).

The *PANDORA* project of the National Library of Australia (NLA) may provide long term access to significant Australian online publications for national preservation. The usage of metadata based on Dublin Core attributes improves the searching process. The online publications are categorized in monographs, serials, home pages and ephemera. The NLA cooperates with other Australian libraries to ensure that there is no duplication of archive materials (see NLA 1997).

ETEXT: Paul Southworth founded the ETEXT archives in the summer of 1992. The project was started in response to the lack of organized archiving of political documents and discussions disseminated via Usenet on newsgroups. In the last five years three GB of mostly ASCII text are stored (see http://www.etext.org).

PURL: The PURL (Persistent URL) service provides an archive server solution avoiding the "*404 page not found*" error. A PURL is like an URL and associates the PURL with the actual URL and returns that URL to the client. The client can then complete the URL transaction in the normal way. PURL's are the result of OCLC's URN (Uniform Resource Name) standard and library cataloguing communities (see Shafer et all. 1996).

The *Internet Archive (IA)* is an association, which collects and stores materials from the public Internet (WWW, Gopher, Newsgroups, FTP). Any Web page that uses CGI requests or needs to authentificate to get access is blocked by the gathering procedure. The archive is not yet publicly available but provides free access to researchers, historians and scholars. The IA archive size is about 14 TB (mostly Web sites) since 1996 to the time of writing this paper (see http://www.archive.org).

Alexa: Alexa is a free Web Navigation Service that gives a public access to the IA and rates Web sites of IA. The navigation tool works with common Web browsers. Information about the page recently visited are available (related links, quality, traffic, actuality, etc.). Alexa provides a "*non-dead link*" service by offering archived pages of IA (see http://www.alexa.com).

Google: Google is a fast search engine which uses the patented PageRank™ – technology. PageRank counts incoming links to a document and assesses also outgoing links. "*Google stores many web pages in its cache to retrieve for you as a back-up in case the page's server temporarily fails*" (see http://www.google.com).

Offline browser: Offline browser tools gather single HTML pages or structures including embedded objects (images, scripts, audio and video files). Such systems follow the idea that reading takes much more time than to replicate the pages. Thus, the reading process can be done offline. Examples of free tools are WebStripper™ (see http://webstripper.net) and WebCopier (see http://www.maximumsoft.com.)

Based on the survey (see above) and the related work (stated so far), the authors of this paper propose a solution in the field of scholarly work. Existing commercial and non-commercial mirroring tools provide only offline browsing on the local file system. Furthermore, online archiving systems cannot guarantee that documents of interest are archived. Therefore, the proposed scholarly solution follows a different idea. Users have to be supported in the process of collecting relevant information from the WWW or Internet by less or even no further effort. In addition, they have to be supported to manage these resources and enabled to enrich these resources with remarks, quality metadata, etc. Because of the human effort within the process for discovering *good* and *relevant* information, such resources and its meta-information should also be provided other users, research teams, scholar organisations and Internet communities for further research. Based on the results stated so far, the *WebSave tool* was designed, which is discussed in the following Chapter.

The WebSave Tool

On a glance, the *WebSave* tool is a Java based prototype implementation, which supports users at their research process within the scholar sphere. Unlike existing offline browsing tools, the advanced and novel system manages relevant information of the WWW by importing bookmark files from common browser clients. First, the users' view of the WebSave tool is discussed, followed by brief information of the administrators' view and the cooperation with the xFIND system. A more detailed discussion of the archiving of resources in electronic media and a detailed description of the WebSave tool can be found in Lackner (2000).

Simply by using a common Web client, interesting links can easily be collected as *bookmarks* placed in particular folders. Different folders can be assigned to different projects or chapters of scholarly works. The WebSave tool imports these *link collections* and supports the user to manage these resources. In addition, any of these projects can be titled and described in an abstract by additional attributes. It should be noted that also incremental updates from the bookmark list could be performed. That means that users can search for relevant information on the WWW, set bookmarks and finally import the bookmark information in the WebSave environment. Within another session, further relevant information can be added to the corresponding bookmark folder and incremental imported. Because of the short life of Web sites, it is recommended to gather the documents of interest within some days (at the time of writing a paper).

WebSave append additional information (WebSave system information and metadata) to the imported bookmarks. System information is e.g. identifier, last visit time, last modification time, etc. Metadata are e.g. notations as well as quality metadata (xQMS), etc. The xQMS (xFIND quality metadata scheme) consists of descriptive (e.g. subject domain, etc.) and evaluative (e.g. authority, target audience, etc.) quality metadata. xQMS is developed by the xFIND group (http://xfind.iicm.edu) and described in detail in Weitzer (2000). In addition, the WebSave tool provides literature entries of the resources by compiling reference identifiers, the reference descriptions (author, organisation, year of publication, title, version), the time of last visit and finally the time of the saving process (see also below).

Furthermore, the resources can be gathered and locally stored on the file system. That means that a relevant bookmark imported by WebSave refers to a document available as HTML with embedded graphics, scripts, applets, etc. The tool stores the HTML files as well as the embedded objects. The WebSave tool manages several projects for any user and allows the cooperation of users. After finishing a project the literature list can generated automatically by the system. Furthermore, WebSave generates an HTML version of the list of literature and prepares links to the local (cached) Internet resources. WebSave supports the preparation of the Internet resources and its metadata for a CD-ROM production. The HTML reproductions of a project comprise the project abstract, summary, reference list including links to local stored sources as well as links to the original Internet sources. Users who are finishing diploma theses can also provide an electronic version of their work and in addition provide local (saved) versions of referred Internet resources (CD-ROM version of the work).

WebSave allows the usage by more than one user. All data are stored in a subfolder of a predefined network directory. The subfolder contains the entire set of user data (personal data, project data, etc.), which can be managed by the user and administrators. Within any subfolder, Web resources are stored also project dependent and managed in the original hierarchy. Also the embedded objects of HTML files are mirrored within

the same structure if these objects are located on the same origin then the HTML files. It is to be mentioned that duplications of objects are enabled, because in different projects different version of objects can occur.

The WebSave administrator view provides more options. Administrators can admin a group of user (e.g. a. course, a research group, a research institution, etc.) by adding, editing and removing user records. Administrators are enabled to collect user folders or user projects building a scholarly knowledge pool. An HTML reproduction of the knowledge pool can be built to place them at the disposal of an institution library (e.g. CD-ROM, Intranet, etc.). They also allowed to evaluate, edit and add xQMS metadata (Fig. 1). In addition, they can prepare the repository to render them searchable by the xFIND search system (see below).

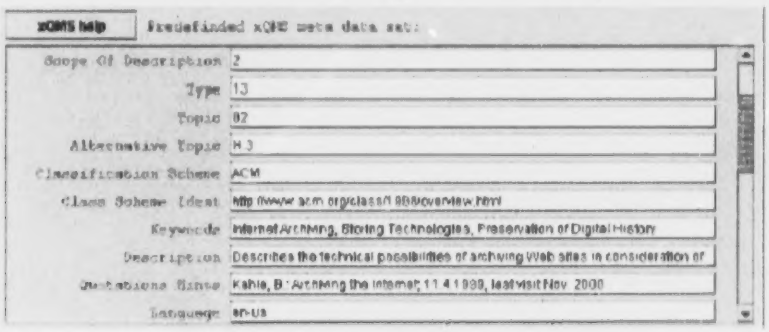
xQMS help
Predefinded xQMS meta data set:
Scope Of Description 2
Type 13
Topic B2
Alternative Topic H.3
Classification Scheme ACM
Class Scheme Ideat http://www.acm.org/class/1998/overview.html
Keywords Internet Archiving, Storing Technologies, Preservation of Digital History
Description Describes the technical possibilities of archiving Web sites in consideration of
Quotations Kahle, B.: Archiving the Internet, 11.4.1998, last visit Nov. 2000
Language en-us

Figure 1. Web resource metadata editing form

As already stated above, discovering relevant information causes substantial human effort (a scientist looks up to 100 documents before finding a relevant one). Because of that, *good* and *relevant* information as well as additional information (descriptive and evaluative quality metadata) should also be archived and provided for further scholarly works by users, organisations and communities. In addition, these (local) metadata have to be used to improve the retrieval process of the resources. A possible solution meeting this requirement is the novel xFIND (extended Framework for Information Discovery) system (see xFIND 2000), which can build an index of the local Internet resources. Furthermore, the system combines the full-text index of the resources with the quality metadata and allows an improved search process (e.g. looking for a peer reviewed paper containing the phrase "*web based training*" in the full-text). In addition, the system also allows to index the original sources and to track changes of the resources. In a further version, a notification (e.g. user who referred the Web resource) will be performed. The human-created metadata (provided by the WebSave tool) and the computer-automated information (processed by the xFIND system) of the resources represent a helpful and growing information repository based of references of scholarly works. The idea follows the strategy of causing little effort by any individual within their research process (e.g. working on a paper), and accumulated output (a big background library of distributed Web resources and valuable metadata for the retrieval process) for the scholar communities or mankind. It is worth mentioning that the aim of the xFIND system is to build up a distributed, huge knowledge management system for Web resources enriched with descriptive and evaluative metadata.

Current and Future Work

Current work is going on to develop an interface layer for data exchange between the xFIND system and the WebSave tool. As a future work, in addition to local archiving of Web resources, an interface for an online document archiving system will be implemented. The first prototype implementation will be done on a Hyperwave Information Server (see http://www.hyperwave.com), which supports versioning and an advanced rights management. Thus, new relevant information of Web resources provided by the WebSave tool is transmitted to the xFIND system. The later system gathers the new documents and renders the full-text as well as the additional metadata searchable. In addition a document repository is requested to archive the Web resource. If the xFIND system detect any changes of the document, the document archiving system will be informed to archive also the new version.

BEST COPY AVAILABLE

Conclusion

It is obvious that increasingly Web resources are cited in scholar works. However, the problem of changing and removing of these resources requires solutions to preserve this referred information for further access. The WebSave tool in combination to the xFIND system is a possible solution to counteract the shortcomings stated so far. First experiences by the usage of students have shown that the tool will support their scholarly work preparing studies and diploma theses. The preservation of valuable Web resources and the enrichment of quality metadata allow to build up a growing scholarly knowledge repository, which supports further scholarly work. The xFIND system can be perfectly used to renders such repository searchable and provides an interface to the original sources and tracks changes of them.

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Acknowledgements

We thank all of members of the IICM and the xFIND team, who have supported the work on the WebSave tool. Especially, we thank Prof. Maurer, who has inspired our work.

Furthermore, we thank Infodelio (http://www.infodelio.com), which has supported us finishing this paper and has financed the conference fee and travel costs. Infodelio is working and researching e.g. in the field of Web resource discovery for research departments and scholar institutes.

iMovie and Educators: the Right Partnership for Making Digital Movies

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The use of digital video and video desktop applications is spreading. So is the word about the ease of use of iMovie, the Macintosh software, used for creating finished digital video products. IMovie is a digital video editing application to help beginning users create digital movies from existing digital video footage. Beginning moviemakers can transfer clips from their digital camcorders, edit and arrange them into stories, add transitions, animated on-screen titles and publish them to the web.

The main focus of this interactive session, organized by a group of Apple Distinguished Educators (ADE), is to demonstrate the ease of use of this Macintosh application in the creation of digital videos in education. The demonstration would include:

- Transferring video from a dv camera into iMovie on the computer
- Demonstrating the digital video editing process
- Adding transitions and titles
- Adding narration, music and sound to the video track
- Transferring digital video back to tape

Digital video cameras, PowerBook's and iBooks will be available to session participants so that, in small groups, they can try some of the demonstrated techniques with sample video/audio files provided during the presentation. New and experienced users will find value in exploring the software and in seeing the examples of how iMovie is used.

Following this hands-on experience presenters will share examples of how iMovie and digital video are integrated into the educational arena. Examples will include projects created by K12 students and current practitioners as well as examples of efforts to improve technology experiences in pre-service and graduate teacher education. Participants will see examples from teacher credential students and early education teacher iMovies. Creating these clips can serve as a teacher tool as well as an opportunity for student involvement in the process. Presenters discuss the ways in which digital video's importance as an instructional tool can be demonstrated through its use in improving student learning by expanding the skills of emerging teachers. It is one example of a tool that allows faculty to focus on the critical need for teacher preparation reform to effectively use technology. As the ability to 'read' and plan visual communication becomes more and more important in students' lives, these tools help teachers to provide the needed skills in an authentic experience. There will also be opportunity to discuss the organization of workshops for helping new users of iMovie.

Creating Multimedia Web Sites in a Flash

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Abstract The challenge of developing engaging, interactive webs site has spawned a variety of technologies including Java, ActiveX, Shockwave and Flash. Those teaching educational technology courses that include some web design are finding that they need to incorporate some of these technologies in their courses. The purpose of this paper is to present an overview of Macromedia's Flash, one of the most popular tools used in creating multimedia web presentations. Flash is a program that allows users to easily create full-scale interactive multimedia splash pages that can be delivered over the web (DelRossi, 2000) and allows both professional and amateur Web site designers to deliver fast interactive web pages even over slow modem connections.

Introduction

This session will provide an overview of how to use Macromedia's Flash to develop engaging, interactive web sites. Flash makes it possible to develop fully animated web pages that allow learners to discover concepts that are not readily accessible on pages in a textbook or on static web pages. Educators can use Flash to create sophisticated presentations for the Web. For example, animation can be used to show water flowing into a beaker or to show shapes dividing to illustrate the concept of halves. With the help of Flash, web sites can contain interactive timelines and maps. Today's teachers need to be trained how to create educational Web sites where users are able to interact with the information. Davitt (2000) states, "the use of Flash and other interactive animation software as a visual thinking tool looks set to take off in schools." The session will provide a discussion of the advantages and disadvantages of Flash and provide participants with specific examples.

Flash makes it possible to develop fully animated web pages that allow learners to discover concepts that are not readily accessible on pages in a textbook or on static web pages. Educators can use Flash to create sophisticated presentations for the Web. Animation can be used to show water flowing into a beaker or to show shapes dividing to get across the concept of fractions. With the help of Flash, web sites can contain interactive timelines and maps. Today's teachers need to be trained how to create educational Web sites where users are able to interact with the information. Davitt (2000) states, "the use of Flash and other interactive animation software as a visual thinking tool looks set to take off in schools."

For example, the School Board of Palm Beach County, Florida has adopted Macromedia Dreamweaver as the standard authoring software for all Palm Beach County schools to use for Web page development. A majority of the schools have purchased the software in a bundled educational package that also includes Flash and Fireworks. The teachers have this software at their fingertips, and the county is offering free training that grant in-service points. Other counties are sure to follow in their footsteps.

The basic paradigm used to develop Flash applications is similar to other Macromedia development tools like Director and Premier. Flash applications, called movies, can include animations, buttons, pictures, sound, and text. Flash allows users to create interactive web sites with little or no computer programming. In working with Flash, you create a movie by drawing or importing artwork, arranging it on the stage, and animating it on a timeline. You make the movie interactive by making its objects respond to events and to change in specified ways. When the movie is complete, you can export it as a Flash Player movie, embed it within an HTML page, and transfer it and the HTML page to a Web server. The session will discuss some of the advantages and disadvantages of developing interactive, multimedia web sites with Flash. Topics will include vector versus bitmapped graphics, animation techniques, the Flash interface, and scripting and other features of Flash.

Vector graphics Versus Bitmap Graphics

To optimize graphics for transmission on the Internet, Flash uses vector graphics wherever practical. Because vector graphics represent the images as a series of mathematical formulas rather that storing information on each pixel, they tend to be much smaller files. Smaller files, of course, are essential in any technology delivered over the web.

Animation techniques

The basic animation technique used by Flash is page flipping. Page flipping works by simply placing an object on a background, taking a "snapshot" of the scene, moving the object slightly, and taking another "snapshot." This process continues until the animation is complete. By rapidly "flipping" these pages, the object appears to move across the background. Flash also allows you to designate a starting point and an ending point, and Flash fills in the frames between. This process is called, descriptively enough, tweening. Using tweening, you can even specify a specific path that the graphic object will follow. This section of the paper will give specific details of how Flash implements animation including several screen shots.

Interface

The Flash interface will be familiar to users of other Macromedia's multimedia development products like Premier and Director. The metaphor is "making a movie" and Flash applications have scenes, frames and a stage. Objects are placed on the stage at various points along a timeline. This section will describe the process of developing a simple Flash Movie.

Scripting

While it is possible to develop fairly sophisticated Flash movies without doing any computer programming, Flash does support its own simple programming language called ActionScript. ActionScript is really more of a scripting language that a programming language, so it works more likes creating a macro than writing a computer program. Stringing a few basic commands together lets you add more complex interactivity to a web project (Price, 2000). Flash also makes it easy to create a fill-in form on a web site. Flash associates every editable text field with a variable containing the value currently entered in the field. You can pass the variables between Flash movies and CGI scripts (Long, 1999). This allows you to interact with user input.

Advantages of Using Flash

Flash provides a user-friendly environment that allows the user to develop high quality vector graphics. The resulting Flash movie is a compact file that has been optimized for Internet delivery. Flash movies scale to the viewer's screen size without increasing the file size or deteriorating the graphic quality. The smaller files mean less memory requirements and faster download times. Also you can export Flash movies to QuickTime or import QuickTime files (Price, 2000).

The Flash graphical user interface allows the designer to easily include interactive elements, multimedia, and hypertext links. Flash animated vector graphics are superior to any GIF animation - the file sizes are smaller and they can be changed as easily as any vector graphic). Flash makes it easy to create graphics react to the visitor's actions, creating multimedia Web interfaces to add sound, transparencies, and color blends (Teague, 1998).

Conclusion

Macromedia's Flash program is a significant technology for developing interactive, multimedia web sites that can be used to develop educational applications. As leaders in the field of Learning and Instructional Technology, it is important to keep abreast of such new technologies.

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Using CD-ROM to Guide the Development of Professional Portfolios

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Abstract: This article presents a description and evaluation of a multimedia CD-ROM project, "Developing Your Professional Portfolio for Internship and Beyond, First Edition". It includes feedback from pre-service teachers who used the CD-ROM disk to help prepare their professional portfolios during internship. With the help of the CD-ROM, pre-service teachers developed portfolios that displayed their mastery of Florida's Pre-professional Accomplished Practices, including the use of educational technologies to facilitate student achievement of Florida's Sunshine State Standards. Contained on the CD-ROM disk are examples of electronic and multimedia portfolios.

Introduction

The College of Education and Human Services at the University of North Florida (UNF) has established a pre-service teacher education program that emphasizes portfolio assessment and clinical experiences in school classrooms. At UNF portfolio assessment is defined as the practice of collecting data to make decisions on the progress of pre-service teachers as they develop their understanding of teaching and acquire skill in facilitating student learning. Clinical education is the organized and supervised program of school-based teaching and learning experiences that serves to gradually induct pre-service teachers into the profession of teaching.

This article presents a description and an evaluation of a CD-ROM project titled "Developing Your Professional Portfolio for Internship and Beyond, First Edition". During the past year the CD-ROM disk was field-tested. Feedback on its usefulness was received from pre-service teachers, supervising professors, and education personnel at teacher education institutions across the USA and abroad.

Portfolio Assessment and Clinical Experiences at UNF

The teacher education program of the College of Education and Human Services at the University of North Florida (UNF) prepares professional teachers to effectively participate in diverse and evolving learning communities. The program emphasizes structured clinical experiences in school settings. The evaluation of these experiences by UNF personnel is accomplished through a portfolio assessment process carefully designed and supervised by the faculty.

In the freshman year pre-service teachers complete their first portfolio for EDF 1005 - Introduction to Education. Details of the requirements for their portfolios are contained in the course syllabus. The 18-hour clinical education component of the course provides opportunities to link the applications of their learning with actual classroom experiences with students in school settings. In the sophomore year students complete EME 2040 – Introduction to Educational Technology. A portfolio of technology products linked to teaching tasks is required. Details of the course requirements are contained in the course syllabus.

During the completion of 100 hours of clinical experience through two, two semester hour field laboratory courses, pre-service teachers prepare working portfolios through which they document their work with students in classroom settings. These working portfolios contain collections of carefully selected documents used to portray their professional growth. (Boulware and Holt, 1998) Details of the requirements for the courses are contained in the course syllabi.

The culminating experience of the teacher education program is a sixteen-week internship during which pre-service teachers produce their professional portfolios. These portfolios are a selective and streamlined collection of teaching and learning materials that include a documentation of their mastery of Florida's 12 Pre-professional Accomplished Practices. (Florida Education Standards Commission, 1996) Details of the requirements for internship and the portfolio assessment process are contained the internship handbook.

Professional Portfolio Literature

During the past few years an interest in portfolio development for teacher education has gained considerable momentum. There are several excellent books and articles that provide comprehensive information on the current state-of-the-art of portfolio development.

Campbell, Melenyzer, Nettles and Wyman (2001) provide helpful details to pre-service teachers for developing their portfolios. They state that the creation of portfolios is an authentic and holistic way to illustrate the developing professional competence of pre-service teachers. They found that portfolio development enables pre-service teachers to chart their own professional growth while following step-by-step procedures. In another publication (2000), the authors provide information for teacher educators on the portfolio development process. The critical elements of a well-designed portfolio assessment system are defined and illustrated. The authors provide directions to link performance assessment tasks to adopted state and national standards for success in professional education while making them faithful to real-life teaching. They provide specific help with the design and use of portfolio rubrics to assess the performance of pre-service teachers.

Farr and Tone (1998) provide a multitude of illustrations and helpful information on portfolio and performance assessment for improving teaching and learning in the school classroom. The authors define portfolio assessment as "the practice of saving lots of things that a student creates so that the student and the teacher can look at the collection and see how the student is doing" (p. 11). Portfolios are viewed as collections "organized in such a way as to reflect, promote, and report a considerable amount of thinking that students have applied to the contents in them" (p. 11). They believe that portfolios should "inform the teacher about the student's progress as a thinker and language user, while indicating how effective the instruction has been and what additional instructional emphases are needed" (p. 11).

Cole, Ryan, Kick and Mathies (2000) provide definitions, strategies and details on the uses of portfolios and electronic portfolios across the teacher education curriculum. They define and describe a variety of useful tools for incorporating educational technology into college teaching and learning. They note, "bringing the learning process alive and using portfolios to document the products of this process requires various technologies" (p. 53). They suggest teacher educators consider the incorporation of the following with their use of computers in education: Local and wide area networks; servers; school networks; on-line databases; global educational networks; optical media; laser discs; Zip and Jaz cartridges; CD-ROM disks; scanners; digital still cameras and camcorders; and multimedia software.

Barrett (2000) defines several categories for the evolution of electronic portfolios and provides a conceptual framework for thinking about their development. She describes two bodies of professional literature that define the process for developing electronic teaching portfolios to support long-term professional growth: The multimedia development process and the portfolio development process. She illustrates levels of technology for developing electronic portfolios that are appropriate at each stage of the professional development of teachers.

Read and Cafolla (1999) provide an extensive review of the portfolio literature. They base their portfolio assessment work on a constructivist theory of learning which "views the learner as actively engaged in the construction of his or her own representations of knowledge" (p. 98). They found that the process of creating professional portfolios requires pre-service teachers to "engage in self-reflection as they select performance items for their portfolios" (p. 99). The authors view the production of portfolios as a means for pre-service teachers to provide evidence that they have met national and state professional education standards. They found that standardized and criterion-referenced tests fail to fully reflect the actual learning that takes place during instruction in teacher education. They describe the computer software and hardware used for the successful production of multimedia portfolios in their pre-service teacher education program.

Hartwell-Young and Mouriss (1999) offer help to teacher educators interested in digital portfolio development. The purpose of their textbook is to help teachers learn how to use multimedia to describe their unique teaching and learning experiences and to reflect on how they grow and develop their professional life. The textbook is designed to help teachers "understand ways in which technology can assist them to record and communicate their professional achievements, and how they can share what they have learned with students to help them unlock the secrets of multimedia" (p. 3).

Holt and McAllister (1999) provide a research-base for their work with electronic portfolios. They describe the implementation and evaluation of a five-year project with electronic portfolios for pre-service

teachers linked to the electronic folders of their students. They provide details on how computer software for language arts, mathematics, and science was successfully employed in school-based professional development classrooms through collaboration between a school district, university teacher education program, and business partners.

CD-ROM Development

Read/write compact disk technology, commonly called CD-ROM was selected because of its effectiveness as a means for presenting the multimedia needed to accomplish the teaching and learning outcomes of the project. CD-ROM enabled the author to include computer graphics, digital video, photographs, recorded sound, scanned documents and text as integral parts of the learning product. The media also provided a means to illustrate a large number of examples that included samples of electronic and multimedia portfolios.

The computer hardware and software used in the production of the CD-ROM included a powerful multimedia personal computer with large RAM and hard drive equipped with stereo sound; read/write CD-ROM recorder/player; digital capture card; color scanner; digital still camera; camcorder; video capture card to convert analog video from a video camera or VCR to compressed video for storage; large storage devices for graphics, sound and video, including an Iomega Zip drive (Iomega, 1998); software to accompany the hardware, including Photoshop (Adobe, 1998); and software for pre- and post-production digital design. The student documents were created in Word (Microsoft, 1998) and the CD-ROM was created in Director 7 (Macromedia, 1998).

The author was responsible for planning the project, including the overall design, script and budget. Help was contracted to complete the storyboard, graphics, audio, video and related production work.

Findings

During the 1999-2000 academic year pre-service teachers used the CD-ROM disk during their internship semester along with other materials to complete their professional portfolios. They completed a feedback form by answering five questions. The results are summarized below.

A. What were the key concepts you learned from this CD-ROM?

How to display mastery of the 12 Florida Pre-Professional Accomplished Practices; The value of educational technology as a means for illustrating the contents of a portfolio; Ways to include educational technology in teaching and learning; The ease of preparing a portfolio; Becoming aware that portfolios help provide prospective employers with a clear view of teaching skills; Ways to provide reasons for the selection of portfolio artifacts; Professional portfolios do not have to look the same.

B. What did you find most useful/meaningful in this CD-ROM?

A better understanding of accomplished practices and the criteria for their documentation; Attractive and interesting artifacts, including bulletin boards, unit and lesson plans, photographs and video clips; Being able to print any page contained on the CD-ROM disk; Receiving a personal copy of the CD-ROM disk so that it could be viewed when convenient; Viewing portfolio examples which were direct and to the point, without a lot of extraneous material; Reasons why portfolios are necessary for professional growth and development; Viewing different approaches to portfolio development; How to write a resume and develop a PowerPoint presentation; Sample video segments on various topics, such as a personal teaching philosophy and classroom management plans.

C. What would make this CD-ROM even more useful/meaningful?

Add more detail on navigating through individual accomplished practices; Refine the back buttons; Add more video episodes of classroom teaching; Include additional artifacts illustrating the accomplished practices; Make the CD-ROM disk cross-platform for both the PC and Macintosh computers.

D. What ideas or information will you apply?

Incorporate lots of educational technology into the professional portfolio; Use the CD-ROM disk as a reference guide while building the professional portfolio; Include videotaped examples of classroom teaching to document teaching skills and learning outcomes; Incorporate ideas found in the table of contents from the sample portfolios as an organizational structure for the professional portfolio; Include student electronic folders to illustrate knowledge gained from instruction; Develop a personal CD-ROM portfolio from the professional portfolio.

E. What additional comments do you have?

The CD-ROM disk helps with the preparation of a professional portfolio; Learning how to develop a professional portfolio and incorporate good video clips is good preparation for the process of preparing for National Board Certification of teaching. The CD-ROM disk helps relieve anxiety about the task of developing a professional portfolio by providing model examples to clarify the expectations for doing the assignment.

Summary

CD-ROM technology can help pre-service teachers with the production of their professional portfolios. Through the uses of multimedia, pre-service teachers were able to learn that portfolios are a natural way to document their professional growth and development during internship and throughout their teaching careers.

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Software Sources

Adobe Systems Incorporated, 345 Park Avenue, San Jose, CA 05110-2704. Available online [http://www.adobe.com]

International Business Machines Corporation, New Orchard Road, Armonk, NY 10504. Available online [http://www.ibm.com]

Iomega Corporation, 1821 West Iomega Way, Roy, UT 84067. Available online [http://www.iomega.com]

Macromedia, Incorporated, 600 Townsend Street, San Francisco, CA 94103. Available online [http://www.macromedia.com]

Microsoft Corporation, One Microsoft Way, Redmond, Washington 98052-6399. Available online [http://www.microsoft.com]

Multi-agent system for supporting cooperative learning

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Abstract: Over the last several years there has been significant progress in techniques for creating autonomous agent, i.e, systems that are capable of performing tasks and achieving goals in complex and dynamic environments. In this paper we presente the architecture of the system SACA(Système d'Apprentissage Cooperétif basé sur le modèle d'Agent). Which is a multi-agent system to support cooperative learning.
In this system, the agent is modelled in terms of their capabilities and mental states. This system is composed of a set of agents(human and artificial). We present here its main features.

1. Agent Model :

Shoham proposes an agent architecture in which each agent possesses the concept of mental state(e.g. belief, intention, obligation) as an internal expression(Shoham 1993). Also, the agents in GRACILE have already been designed adopting the framework proposed by Shoham (Ayala & Yano 1995). To design and construct an agent model, we reffered to their view of an agent model.
For us, an agent consistes of a knowledge base wich includes beliefs and commitments to itself and to other agents, a set of function modules that constitute the agent's capabilities, a communication module in order to communicate with other agents and a reasonning module for updating the mental state/commitments of the agent.

2. Architecture of SACA :

SACA is composed of a set of agents (human agent and artificial agent). The human agents are: Learner agent, Author agent and Formative agent. The artificial agents are: Tutor agent, Domain agent and Evaluator agent. Artificial agents are cognitive agents.

1. *Domain agent* : allows to represent the matter to be teached. This matter is organised on educational objectives related by a « prerequest » relations(Lafifi & Bensebaa 2000).
2. *Tutor agent* : orients the learner (propose an educational objective to the learner, this educational objective is adopted to his knowledge level) and provide learner with informations about cooperation opportunities with their peers.
3. *Evaluator agent* : evaluates a learner in an educational objective.
4. *Learner agent* : has informations about learner and facilates the task of learner to communicate with their peers or in the learning task.
5. *Author agent* : is the responsible of the construction of the matter to be learned. It creates the educational objectives and makes the conditions to present theses educational objective, i.e. « prerequest » objectives.
6. *Formative agent* : is the responsible of the formation process of learner from the initialisation to the achievement of their formation goals.

3. Conclusion :

We had presented an architecture of a system that offer the possibilities to the learner to cooperate/collaborate with their peers. For doing this, the tutor agent posseses information about the knoweledge state of learner(Student Model). This tutor can give advices to learners and can provide them by informations about cooperation opportunities. Our system is a multi-agent system that is composed of a set of agents(human and artificial). Now, we are in the step of implementing this system.

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Practice on the Web: A Tool for Learning from Cases

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Abstract: Cases and case methods of teaching represent a promising approach in education. This approach has always been best used to teach people about realistic decision-making situations. Case methodology is especially effective if students are required to identify facts and issues, to view events from different perspectives, to apply current professional knowledge and research, and to predict consequences of various courses of action. The purpose of this work is to present an application tool for the development of case-based web environments. This tool is a reusable, component-based application that can be specialized to produce custom applications.

1. Introduction

Cases and case methods of teaching represent a promising approach in education. This approach has always been best used to teach people about realistic decision-making situations. Nevertheless, cases have been used extensively for professional preparation, and are only now beginning to be widely employed in education (Merseth, 1991). Case methodology is especially effective if students are required to identify facts and issues, to view events from different perspectives, to apply current professional knowledge and research, and to predict consequences of various courses of action (McNergney, Herbert, and Ford, 1993).

The use of case methods can help students to forge important connections between knowledge and practice (Cooper and McNergney, 1995). Case-based learning is a flexible model where an lecturer uses leading questions to direct students toward "correct assumptions". Cases are like stories or story lines that students read or explore interactively. They can direct students toward a conclusion, or provide the resources and context to discuss and debate issues dynamically. During a case-based process, the students must be involved in authentic practices.

From the point of view shown above, the case-based learning model is not far removed from direct instruction. However, if the students are allowed to formulate their own opinions of a case by promoting group-coordinated research activities, debate, or simulated decision making, the model is more closely aligned with social constructivism (problem-based learning).

Two primary methods are possible to deliver cases (Jarz, Kainz, and Walpoth 1997). The first is a low-tech option of simply presenting the case to a class, then debriefing and discussing orally. This way is best suited for face-to-face lessons, with both students and lecturers on the same place at the same time. The second is using technology. A system can contain case information and increase the possibilities for student interaction with the data (collecting, sorting, organizing, etc.).

The purpose of this work is to present an application tool for the development of case-based web environments. The tool is a reusable, component-based application that can be specialized to produce custom applications.

2. The Case-based Training Environment

The Case-based Training Environmet (CbTE) is intended to aid the acquisition a specific ability, using a series of cases. A case places a practical problem for a student, who needs to choose the action that solves the problem shown in the best way. For example, a company wants to train its management staff in Organizational Leadership. The following case could be created: a very productive employee informs his manager that he is

unhappy because his wage is below the market's average for his position. However, the company cannot afford a wage raise. What is the best way to handle this situation?

A set of cases can be created to develop a specific ability. A case describes a situation and presents a list of possible actions among which the student must choose the best way to handle the situation shown. A set of cases build what is called a training module in the CbTE. Training modules are created with an authoring tool, and they are saved in a format that allows its easy installation into the environment. An author can create a training module in three different modes: Training, Evaluation and Outline.

In the Training mode, each case shows its references and all its action options. When a student selects an action, the best answer and a feedback for the chosen action are shown before the next case is exhibited. In the Evaluation mode, each case presents all its action options, but its references are omitted. When a student selects an action, the next case is exhibited immediately, showing neither the best answer nor the feedback for the chosen action. In the Outline mode, each case shows only its best answer, along with its references and feedback.

Figure 1. A case sample (in Portuguese)

While solving the cases presented in a module, a student leaves his passage track. The CbTE does not require a student to go through all the cases of a module at once, except in an Evaluation module. The student can stop, continue or restart his track.

A student can go through the cases of a training module in three different ways. In the Pre-ordered way, the cases are shown in a pre-defined sequence defined by the author. In the Random way, the cases are shown randomly, in an order sorted by the environment. In the Custom way, the student chooses the sequence he wants to follow the cases.

There is also the Free Access module. Any student can access this type of course, which does not even require enrollment.

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3. Administrative Area

The CbTE has an administrative area where it is possible to have a comprehensive control of the learning environment. An administrator is responsible for installing training modules created by instructors in an offline tool (as we shall see later in this work) and registering the students who will participate in each module. As a result of a module closure, the administrator can view a whole set of student performance statistics, such as, case most common mistakes and students tracks. These statistics can serve as reports for the faculty board or for the HR department, for example.

The CbTE'a has an open architecture based on components. This component-based architecture allows the integration with other faculty/corporative systems and with other existing training environments. This way, it is possible to create a fully customized training environment using a subset of CbTE's components and an all-new Web GUI.

All the communication exchanged between the CbTE and a corporative system is done using XML (extensible markup language) with predefined DTDs (document type definition) for each type of communication. XML has been designed for ease of implementation and for interoperability (W3C, 1998). So, the tool's persistence mechanism becomes completely transparent for the corporative system. This feature aids the integration with other systems, simply requiring the development of a "driver" that is able to understand both the corporate system and the tool's XML interface.

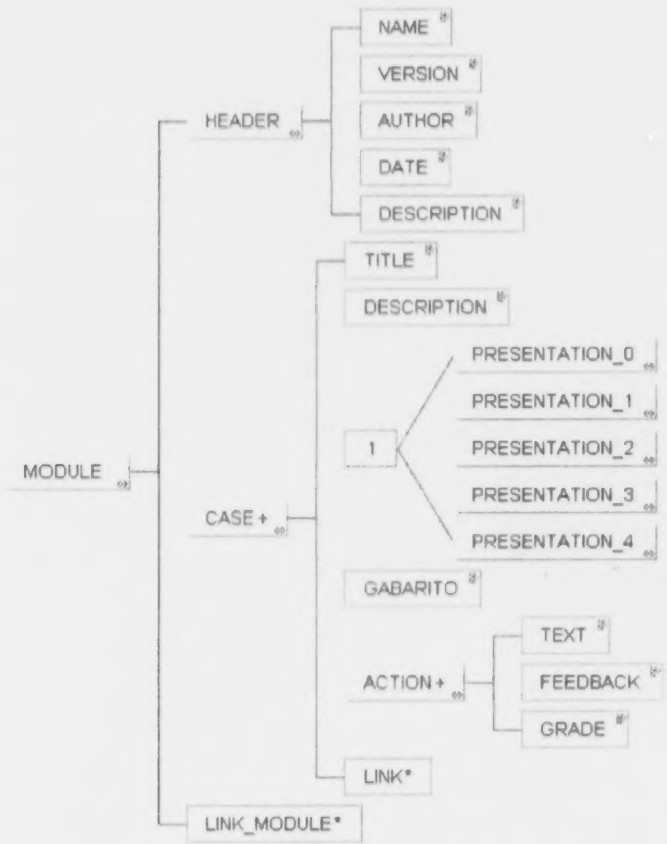

Figure 2. Module DTD

4. Authoring Tool

There is also a standalone (non-Web) authoring tool that allows the independent creation of training modules. The instructor does not need to be online to develop modules. Since some module cases may have rich multimedia contents, such as videos, animations and so on, the offline aspect of module generation allows for rapid development without the burden of multiple file uploads and downloads to the CbTE server.

The instructor must indicate what module he is creating: Training, Evaluation or Outline. He also needs to indicate how the students will access the module cases and, whenever it applies, how many times a student can go through the module cases.

Currently, cases within CbTE's training modules support the use of images, applets, videos, texts and shockwave animations, i.e., basically all kind of media a browser can display. Thus, the instructor can choose the way he finds best to introduce the case problem, enriching the students learning experience. Besides case introduction, the instructor can insert context-specific references (only for Training mode modules) for each case for student consultation during the case problem solving. These references serve as the support didactical material in the training module.

These modules can be easily installed (imported) to the CbTE by the local administrator. The authoring tool generates a XML representation of the module data. XML representation releases the instructor from having to worry about interface aspects, which is a administrative task. In addition, XML is a step forward learning environments integration. Since the contents of a training module are represented in XML, they do not hold proprietary interface properties. This makes possible for a specialist to develop a training module that can even be commercialized with institutions that use the CbTE as their training solution.

5. Conclusion and Future Work

This article presented an application tool for the development of case-based web environments. The case-based training method is a powerful hands-on/experimental approach for learning process. The tool is a reusable, component-based application that can be specialized to produce custom applications.

The CbTE has an area for students where they are able to go through the training modules and an administrative area where an administrator can install modules, register students, etc. These areas have a Web-based interface, requiring them (students and administrator) only to have a browser to use the tool's functionalities. The CbTE has also a standalone application for module authoring. This application allows the independent creation of modules, serving as a work tool for content generator enterprises.

Cases within training modules are multiple choice-like questions. In next versions of CbTE authoring tool, it is intended to provide other kinds of case representation, such as true or false, matching etc.

Currently, the CbTE is an all self-paced training tool. However, the Web brings a whole set of capabilities for collaboration that can be used to enhance learning experiences. The CbTE will support online learning groups. Doing so, it will be possible for the students to share their experience with others. Student interaction is always helpful, increases the motivation and saves time, leading to a better overall learning process. It may also be used a help desk to allow the communication between students and instructors (and possibly the administration).

The CbTE has a component-based structure to facilitate its integration with other pre-existing corporate systems. The data communication between legacy systems and the CbTE is done through XML documents with specific DTDs for each type of communication required. XML is a tool to help solve data-management problems.

The XML nature of training modules generated by the CbTE's authoring application aids content exchange and commercialization. We seek to create a specialist environment, where specialists (content providers) can exchange and trade training modules.

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Middle School Education and CD ROM Technology

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Abstract: This paper presents a cursory overview of CD ROM applications to instruction. This is followed up by a specific example of how a CD ROM resource was created for use in a Middle School Teacher Education Course. The CD ROM was purposefully designed to allow instructors flexibility in how it may be integrated into the curriculum. In closing, the paper will entertain the notion of designing software with an understanding that the instructor may subvert the intended classroom usage.

The Promise of CD ROM Technology

The advent of recordable and rewritable CD ROMs has revolutionized data storage due to the low cost of the media and associated CD burning hardware/software. As an instructional tool, CD ROM technology has many advantages by comparison to other recordable media. Stibbons, (1997) suggested these include: (1) significant capacity for storage of graphics, (2) rapid and facile access to the storage medium, (3) the potential for information sharing through hypertext linking and (4) the ability to treat the CD ROM as a searchable database.

The CD ROM has enjoyed a plethora of applications in a variety of educational settings. Table 1 outlines but a few of the categories and specific examples where CD ROM has been successfully implemented.

In the Middle School Project described herein we have capitalized on the ability to store documents on CD ROM in the efficient Adobe Acrobat format. The ready availability of Acrobat reader software has made the *pdf* file format a very useful tool to the educator. The companion Acrobat Writer program allows you to save text and graphics together as a single document using far less memory than either scanned documents (graphic format) or text and graphics separately. The Acrobat software environment allows for a user-friendly interface that includes a simple hyperlink table of contents menuing system and a built-in search engine. In this project the Acrobat Writer software was used to create the Middle School resource which students in turn could access using the Acrobat Reader.

The Infrastructure for The Middle School Project

At Acadia University we offer teacher preparation programs which include a course in middle school education as part of our two-year post-degree teacher certification program. Students completing the program receive a Bachelor of Education and are issued a public school teaching license. Acadia University however is unique in that it is the first laptop university in Canada. The so-called "Acadia Advantage" program was initiated in 1996 in partnership with IBM. In effect this puts a laptop computer in the hands of every student on the fully-wired campus network. This has had profound instructional implications (MacKinnon & Hemming, 1998).

The CD ROM project I am about to describe makes particular use of the fact that all students in our middle school courses have anytime-anywhere use of an A20m IBM ThinkPad®. Student computers are equipped with the latest multimedia capabilities as well as a complimentary software package that includes Adobe Acrobat reader.

CD ROM Applications	**Examples/ References** (full citation in bibliography)
To support textbooks with additional resources such as pictures, videos and tutorials.	ChemCDX software by Kinsland, L. & Perkins, R. accompanies the text General Chemistry 2nd ed. by Petrucci & Hill
Individual software programs for: a) teaching content b) teaching process	Opheim, C.& Stouffer, W (1997).
Use of CD ROM databases for research and to simulate authentic learning environments	©Microsoft Bookshelf Seedhouse, P. (1996). Manzari, L. (1998). Dalhousie University Medical School
Searchable Conference Proceedings	Mathematics & Science Technology
Storage of professional information in the form of an electronic portfolio.	Corwin, T. & Hagen, S. (1997).
Graphic and textual information retrieval in public school education	Hayden, T. (1997).
Interactive CD ROM integrated into curriculum & instruction	Hilgendorf, T. R. (1998). MacKinnon G. R. & Forsythe, T. (1999).
Distance education applications such as correspondence courses	Gallagher, J. & Stevenson, D. (1999).
"Hybrid disks" which compliment internet delivery of learning	Summers, J.& Reck, L. (1998).
Elaborate CD ROM tutorial systems which include self-testing components	Welch, M. (1999). Rhodes, J. M. & Bell, C. C. (1998).
Electronic books	Guernsey, L. (1998).
Multimedia development of CD ROMs as a participatory research & learning exercise	Wilson, M. & Sullivan, T. (1999).
Professional development applications for public & private sector employees	Fabris, M. (1999).

Table 1: Some Categories of Educational CD ROM Use

Contents of the CD ROM

The Middle School CD ROM has the following components:

- An essay summarizing the middle school movement, the nature of the adolescent and middle school curriculum.
- Adapted case studies surrounding the challenges of middle school teaching.
- Hyperlinked access to current academic articles on the middle school.
- Videotaped interviews of middle school administrators and teachers around a series of relevant topics.
- Powerpoint slide presentations of actual middle schools, highlighting the teaching environment

The interface for the interactive CD ROM is shown in Figure 1. The CD was formatted in such a way that it auto-loads to present this menu to students. From this page students could hyperlink to the theory behind middle school education (as shown in Figure 2). The menuing system in the left column allows students to access

printable course notes. The second component of the interactive CD ROM is the database of case studies. The ready access of these studies as compared to sending students to the library has the potential to promote more efficient use of the class time. On-line articles were prepared by scanning them into pdf format and then placing them on the local campus network. The format and content of video interviews is shown in Figure 3.

Figure 1: The Middle School CD ROM Interface

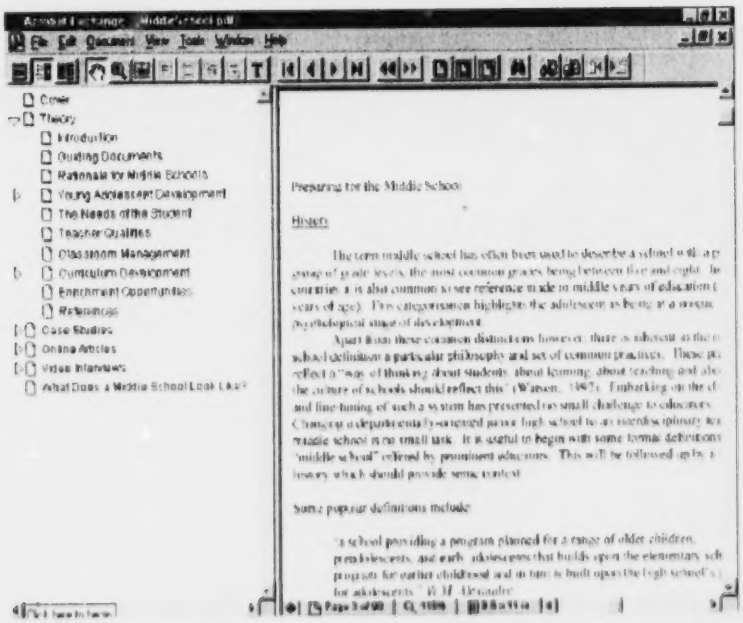

Figure 2: Hyperlinked Menu

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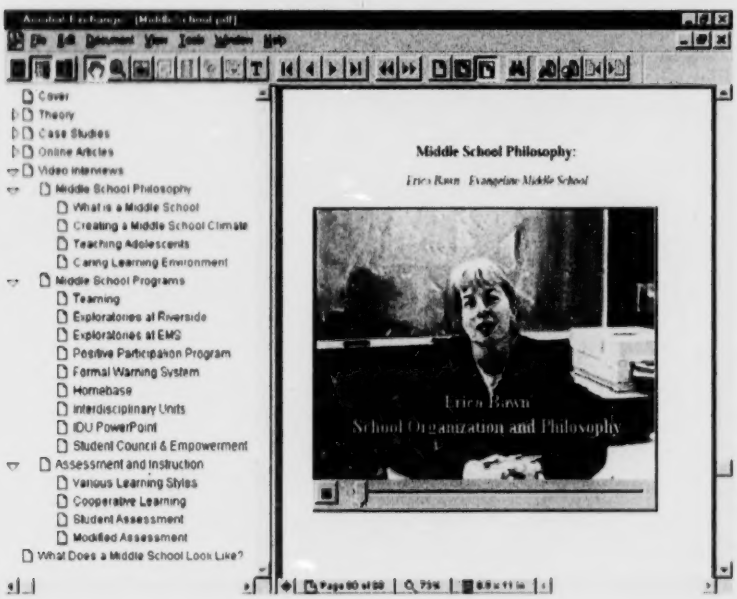

Figure 3: Video Interviews

Design of the Middle School Resource

In teacher education the notion of constructivism (Greening, 1998; Jonassen, 1994) arises frequently. This resource has the potential to be used in a constructivist teaching environment but what about the software itself? In preparing constructivist software the designer faces a dilemma. Clearly knowledge construction has its roots in the experience of the student and as such prior knowledge should have a significant impact on the direction of the instruction. At the same time the software designer no doubt has a vision for how the software might be used in a classroom. Particular structuring of the software may then be counterproductive to true constructivism and more likely to lead to behaviorist responses from students.

Squires (1999) has suggested that despite the software designer's best intentions, instructors will often subvert the intended use of the software and promote more unique applications in their own classrooms. Could this not be accounted for in the design? The Middle School software is a resource which in its simplicity allows the instructor to integrate the resource into their more traditional modes of instruction. Squires calls this approach "volatile design". This flexibility can improve the utility of such a resource to a wide range of educators.

Using the CD ROM in a Real Course: One Approach

The CD ROM acts as a central resource for the Middle School Course. The following is an outline of how the CD ROM is used in one teacher education class.

Class notes: The Middle School essay serves as a basis for discussion in the course. Each small group of students is assigned a topic from the essay and presents this topic to their classmates. There discussion of the materials also includes reference to the database of 95 online articles which they also access from their CD ROM.

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Case Studies: Each group of students is assigned a case study from the CD ROM. The group then leads an electronic discussion of the case with another assigned group in the class. The discussion is peered monitored and evaluated using an electronic discussion group coding system (Aylward & MacKinnon, 1999).

Issues/Strategies in Middle Schools: Students review the CD ROM video clips of topical issues in the schools and use this as a basis to visit a local middle school and conduct teacher interviews/classroom observations around a particular issue/strategy. There are also guest speakers (administrators/teachers) invited to the class. This entire exercise culminates in a short review on the focus issue/strategy.

Online Articles: In their electronic discussion of case studies, students are expected to support their arguments/contributions via reference to an online library of academic articles. Students leading the discussion groups are expected to submit a paper that summarizes the discussion group exchange and integrates this with synopsis of at least three related academic articles from the database.

Interdisciplinary Unit: Students are assigned a theme. Using the CD ROM resource notes on curriculum design, students create concept webs (using Inspiration©) of an interdisciplinary unit on their theme.

In ensuing university semesters education faculty will have the opportunity to use the Middle School CD ROM in the their classrooms. It remains to be seen whether the volatile design of the resource will allow instructors to utilise the CD ROM in novel instructional approaches.

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Acknowledgement

This work was made possible through an Innovative Teaching Grant from Acadia University.

Developing a University-Wide Digital Portfolio System for Teacher Education

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Abstract. This paper describes the collaborative process we've utilized in conceptualizing a digital portfolio requirement for all teacher education majors. We entail the philosophical, logistical, and infrastructure considerations that have been part of the process along with the portfolio model adopted. Finally, we discuss the assessment timeline for portfolio evaluation.

Throughout the country, three conditions guide how schools of education approach the integration of technology into teacher education programs. (1) University faculty and students need the tools, environments, and on-going professional development to integrate technology into the teacher education curriculum. (2) New national accreditation standards are requiring schools of education to prepare new teachers and administrators who can integrate technology into their curricula. (3) Licensure and certification are now requiring proficiency in technology integration for new teachers and administrators. These national and local imperatives are the foundation of our institutional reform.

As our institution plans for the implementation of such issues, the digital portfolio has emerged as a tool that we envision enabling us to assess students' competencies. We also believe that engaging in the electronic portfolio process will help students to develop technology-related knowledge and skills.

Background

By June 2002, our university is mandated to have an institution-wide performance-based Unit Assessment System (UAS) approved by the Indiana Professional Standards Board The UAS has multiple "Decision Points" that are being discussed. A standards-based approach is being used for licensing. The standards, which serve as a foundation for these licenses, include the INTASC Core Standards as the conceptual framework, Indiana Developmental and Content Standards, and the ISTE Standards.

For two years, a campus-wide group called the Teacher Education Performance Assessment Steering Committee (TEPASC) has worked on creating procedures for reaching this goal. In regard to the knowledge, disposition, and performances for teaching majors, TEPASC has recommended that: (a) licensure areas provide multiple opportunities for each student in the program to demonstrate and to document an understanding of the state P-12 proficiencies, and (b) students demonstrate and document successful experiences in planning and executing lessons directly related to relevant P-12 proficiencies. Our institution has identified student digital portfolios as one performance assessment instrument for demonstration of multiple competencies.

In recent years, a number of portfolio types have been used on our campus by faculty from a variety of disciplines. The medium of these portfolios has included paper, PowerPoint, and the World Wide Web. Likewise, the specific purpose of the portfolios has varied according to the needs of the discipline and the preferences of the faculty member teaching the course. As the university began to discuss a campus wide portfolio model for teacher education, it was recognized that cross-disciplinary expertise should be utilized, and that a consensus needed to emerge as to the type of portfolio best suited for teacher education. The decision to recommend a digital portfolio over a paper-based portfolio emerged in part, as a result of parallel initiatives to infuse computer technologies in the teacher education curriculum. The interactive, non-linear attributes of digital media, which may include audio, video, text, numerical data and graphics, may potentially bring a depth and richness to student work and understanding.

As one initiative of our PT3 grant, a team of university faculty met weekly to develop the portfolio model. In addition, a series of experts from other universities and corporations such as Apple computer were brought to campus to provide their insights regarding conceptual frameworks, technological infrastructure, and portfolio logistics. These sessions, which were open to all of the university community, stimulated discussion about the shape and form of our portfolio system. We sought out and examined other teacher education institutions attempting to implement similar initiatives as well as individual faculty across the country working in this area.

Portfolio Purpose

There is no universal portfolio in terms of purpose and structure. Portfolio types include process portfolios, reading portfolios, showcase portfolios, and exit portfolios (see Katz & Johnson-Kuby, 1996). The portfolio structure we envision responds to a variety of needs – personal, pedagogical, and program related. While the overall goal for the digital portfolio is to meet the learning and competency objectives of the program, our goal is to maintain the emphasis on reflection and to highlight the developmental process of portfolio construction. The primary purpose of the student digital portfolio is a cumulative and on-going reflection of their progress and readiness in learning to teach. The portfolio as a whole must reflect the students' entire certification program. That is, students are expected to draw on as many of their courses and experiences as possible. Klenowski (1998) writes that portfolios provide a structure for documenting and reflecting on teaching and learning practice. The portfolio allows for the collection of a range of tasks and information about teaching over time in different settings. Consequently a richer portrayal of teaching practice is possible. Good (1992) writes that portfolios should enable students to think critically about important identifiable content as well as develop particular dispositions.

Given the longitudinal nature of the student portfolio, we hope that student reflection will become more rich and complex as they continue in the program providing quality information that can be used to examine growth and progress over time. Wolf, Whinery & Hagerty (1995) indicate that

> by engaging teachers-in-development in the practice of documenting and reflecting on their teaching, and in holding regular and focused conversations with their colleagues about their practice, we are building individual dispositions and a professional culture that values reflective, collaborative practice (p. 37).

The portfolios our students develop will serve many purposes. A primary goal of the digital portfolio will be to provide a vehicle for students to demonstrate they have met the learning and competency objectives of the teacher education program. Another important objective will be to emphasize reflection and to highlight the pre-service teacher's developmental process. Students will be expected to draw on as many of their courses and experiences as possible. Given the longitudinal nature of the student portfolio, we hope that students' reflections will become more rich and complex as they progress in the

program, providing quality information that can be used to examine growth and progress over time. Finally, students will need to continue to document their development as a teacher via a portfolio during the "induction" phase (first two years) of their professional career. The portfolio students develop throughout their undergraduate curriculum will continue to evolve during these initial years as a fulltime teacher.

Portfolio Structure

A web-based medium has been chosen for our digital portfolios. The web is advantageous for several reasons. First, it is cross-platform. Therefore persons creating and viewing the portfolio can use the computer of their choice. Second, many media types can be utilized on the web including text, graphics, sound, and video. Multimedia will allow for rich representations of student learning and development. Third, HTML is not a proprietary format. As it is an international standard, with each new version slated to maintain compatibility with previous versions, it will endure. Fourth, web files are easily transportable and can be displayed either online or distributed through other media such as CD-ROMs. Finally, a web-based portfolio can be more easily accessed for asynchronous assessment by all stakeholders (teacher education faculty, content area specialists, and P-12 teachers).

Requirements for documenting student competencies in numerous state and national standards compelled us to frame the structure of the portfolio on a more holistic and broad level. To do this, we returned to our institution's conceptual framework based on the Interstate New Teacher Assessment and Support Consortium (INTASC) Standards . Students will reflect on and document their development as teachers in relation to each of the ten INTASC standards. Appropriate artifacts supporting their development in each standard will be hyperlinked within the portfolio.

The categories of artifacts that can be used for sources of evidence are mandated by the state and may include:

1. Classroom Performance – Video
2. Lesson Artifacts (e.g., lesson/unit planning, handouts, slides, assessment documents)
3. Paper/Pencil Tests of Knowledge
4. On-Demand Tasks (e.g., simulations, case studies, problem-based scenarios)
5. Interviews of Candidates
6. Testimonials (e.g., cooperating teachers, university supervisors, students)
7. Products Reflecting Learning of Candidates' Students (e.g., student artifacts)
8. Other Assessments (e.g., self-reports, special projects)

Portfolio Assessment

We have chosen four main stages for the portfolio development process, within which students build toward "decision points" in their teacher training. Table one illustrates the progression through the program and
describes each of the decision points. At each of these decision points, assessment of the portfolio will occur. In addition, selected artifacts of the portfolio will be developed and assessed as part of courses in the
students' curriculum. Artifacts are submitted and assessed at different stages of a student's progress, from admission to graduation. Table one (Tab. 1) demonstrates the progression through the program. Students must successfully complete each stage in order to gain admittance to the subsequent stage.

Description of Stage in Decision Points	Resulting Action
Stage 1: The focus of Stage One is the required introductory teacher education course. Course content centers on informing students of the INTASC and IPSB standards, expectations of the program, and the arena for introduction of computing skills related to portfolio production. Students create a self-assessment document or "autobiography that represents them as learners and individuals. This self-assessment focuses on students' initial reflections about the nature of teaching and education in relation to INTASC standards and the university conceptual framework. The course requirement will include the initial development of a digital portfolio	Decision Point 1: Builds on successful completion of introductory courses in Teachers College and content areas. Becomes teacher education aspirant.
Stage 2: This stage focuses on gathering artifacts to demonstrate acceptable performance with content knowledge and mastery of skills and dispositions, and meeting the ISTE General Preparation Performance Profile in portfolio. Students again submit a self-assessment document. Successful completion of this stage leads to formal acceptance into the Professional Education sequence.	Decision Point 2: Culminates in admission to the Teacher Education Program and may enroll in the Professional Education sequence.
Stage 3: During this stage, students select from their body of increasingly extensive artifacts (essays, evaluation, video clips, lesson plans, etc.) examples that demonstrate sufficient mastery of performance and knowledge relative to content and developmental standards, before admitted to student teaching. Students must also perform at the Professional Preparation Performance Profile defined by ISTE. Students again submit a self-assessment document.	Decision Point 3: Culminates in Admission to Student Teaching
Stage 4: This final stage adds the student teaching experience. Students will select artifacts generated in classroom performances (lesson plans, video of classroom performance, evaluations, etc.) to add to their prior collection in the portfolio. Students must meet the ISTE Student Teaching/Internship Performance Profile. Students again submit a self-assessment document. The purpose is to demonstrate sufficient mastery of standards for subsequent licensure.	Decision Point 4: Culminates in graduation and possible recommendation for initial licensure.

Figure 1: Decision Points and Outcomes

Infrastructure Considerations

Parallel yet related initiatives involve the development and implementation of large-scale Web-based databases that support longitudinal portfolio construction and distribution as a core service of our licensure program. The portfolio database will be integrated into other Web-based representations of competence. A new critical need is to integrate the portfolio with performance assessment records.
This is the systems and infrastructure that will support large-scale, Web-enabled, relational databases that sustain and promote the competency profiling, performance assessment, and digital portfolio initiatives. Teams are building an advanced data engine to support the representation and development of performance and competence. We are building upon established models for examining the NCATE, ISTE and NETS, INTASC, IPSB and P-12 competencies and standards and the ways they interface into the academic cycles of teacher education majors. For the duration of their teacher education experience, students, faculty, and cooperating teachers and administrators will interact with the competency database for the following services:

1. Providing Web-based diagnostics in relation to INTASC, ISTE, NETS, and content area standards and competencies.
2. Evaluating progress towards competence.
3. Represent performance for assessment and licensure.
4. Maintaining student portfolio and coursework relevant to licensure.

Summary

Other infrastructure considerations under discussion include the need for faculty professional development, staffing for support of portfolio development, and a university-wide plan to support and update technical resources . While the development of a digital portfolio system has presented us with many challenges, it has also provided a glimpse into an exciting future for our teacher education program. At the time of this paper, ultimate decisions about the nature of the portfolio and its place in the unit assessment system have yet to be finalized. For example, while we have decided that the portfolio will be web-based, we have not yet come to consensus on issues such as the extent that individual licensure areas will be allowed to customize the "look and feel" of the portfolio. Many of these decisions will be made early in 2001. In addition, ongoing pilot testing of portfolio structures and processes will continue during the Spring, 2001
semester. The current status of our portfolio model will be reported during our presentation.

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Using WebCT 3 to Create Web-based Learning for Multiple Learning Styles

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Abstract: Web-based learning (WBL) is rapidly becoming a staple at all levels of education. Statistics from a national study by the Department of Education in 1997-98 showed almost 44 percent of all higher education institutions offered distance-based courses, an increase of one-third since 1994-95. Estimates are that by the year 2002 there will be more than 2 million students in higher education participating in distance education. In this period of rapid change as education adapts to use the new tools of web-based learning, educators need to consider the foundational concepts of learning theories. Modern learning theories, based on constructivism, emphasize individual differences in learning styles. Focusing on how to use some of the information that learning theory offers can improve WBL just as it has helped with traditional educational environments. This paper discusses how WebCT3.0 can be used to make WBL appealing and effective for a variety of individual learning styles.

Introduction

Web-based learning (WBL) is rapidly becoming a staple at all levels of education. Statistics from a national study by the Department of Education in 1997-98 showed almost 44 percent of all higher education institutions offered distance-based courses, an increase of one-third since 1994-95 (CHEA, 2000). The Council for Higher Education Accreditation found most of the growth in distance education was in higher education institutions that use asynchronous computer-based technology (primarily over the Internet). The Army announced in July of this year that it would spend $600-million over the next six years to enable any interested soldier to take distance-education courses on the Internet at little or no cost (Carr, 2000). Estimates are that by the year 2002 there will be more than 2 million students in higher education participating in distance education.

In this period of rapid change, as education adapts to use the new tools of web-based learning, educators need to consider the foundational concepts of learning theories. Modern learning theories, based on constructivism, emphasize individual differences in learning styles. The most effective learning environments offer content that caters to these individual differences in learning styles. The distance educator must employ a number of strategies focusing on planning, student understanding, interaction, and teaching to ensure a successfully delivered course (Cafolla & Knee, 1999).

Learning theories 101: everything old is new again

The question of how we learn is at the core of all educational theory. Educators and philosophers have been trying to theorize how we learn since ancient times. Theories evolving in more recent times focus on the learner and differences in those learners. Learners are considered to be unique individuals whose learning preferences may significantly vary. Creating content that is learner-friendly for students who prefer a sequential linear content presentation or a more random non-linear preference is important. Older, foundational learning concepts such as Vygotsky's "zone of proximal development" and scaffolding are very applicable to WBL. In computer-mediated learning, scaffolding is more important than in traditional education settings because computer-mediated learning is typically collaborative, and all participants will provide scaffolding to other participants at different times during the learning process (Bull et al., 1999). A second concept is that of dual coding. Memory researchers agree that dual coding is a very effective learning tool (Craik & Tulving, 1975). Dual coding helps in the learning process by using two or more sensory avenues to reinforce memory. Using such dual coding techniques such as relevant visuals and the prominence of imagery use during accretion and retrieval greatly improve learner outcomes (Hodes, 1993). Simonson (2000) uses an Interactive Study Guide (ISG) to help cue visual learners. The ISG is a series of visual cues that link to key lecture concepts to aid memory formation. WBL allows for many different instructional opportunities for dual coding including still images and video elements. Multimedia elements are a critical part of content development on an education web site (Knee et al., 2000).

Instructor/designers who consider the information that learning theory offers can improve WBL just as it has helped in traditional educational environments. The focus of this paper is to show how WebCT3.0 can be used to make WBL appealing and effective for a variety of individual learning styles.

WebCT 3.0 as a tool for creating individual learning environments

WebCT is a multifaceted management tool for creating WBL courses. WebCT 3.0 is the newest version of the software and was released in summer of 2000. This is a widely used WBL software application and version 3.0 will be used in many universities beginning in early 2001 as their primary delivery tool. This most recent release of WebCT 3.0 has a greatly improved designer interface that eases the initial course implementation. Distance learning software such as WebCT 3.0 can be used to facilitate the creation of individual, learner-centered environments. WebCT 3.0 offers a rich variety of communication tools, and has the capacity for the inclusion of sophisticated multimedia elements like streaming video. One of the greatest strengths of WebCT 3.0 is that it allows content to be organized along a linear path, or in a more hypertext driven non-linear fashion, or both dependent upon student needs or desires. Some learners are more comfortable with a structured sequential topical organization and others need to reorganize the content in order to make optimum sense of the presented information. WebCT 3.0 has new features such as the Compile tool, which allows the student to reorganize content into their own set of notes. WebCT 3.0 has introduced a new feature called "breadcrumbs." A breadcrumb is a list at the top of the page that shows the path the student has taken to get to the current page. This breadcrumb tool helps the student build a cognitive map of the web site. The breadcrumbs are especially useful in courses with lots of content where it can be difficult for some learners to navigate down through levels of materials.

WebCT 3.1 Communication Tools

Both synchronous and asynchronous computer mediated communication are key elements in WBL. Communication is a vitally necessary for effective distance learning. Instructors and learners must have the opportunity for frequent and open interaction both between individual students and the instructor and between students themselves. WebCT has a variety of communication tools available for the instructor/designer. These tools include the staples of distance learning communication: email, discussion board, chat rooms, and a whiteboard. The asynchronous WebCT email tool allows every student easy access to every other participant in the class, including the professor. Email in WebCT is server based and not available outside of the WebCT program. Chat rooms are a synchronous communication tool available in WebCT. The instructor can set up

multiple chat rooms devoted to separate subject areas, or interests. The whiteboard tool is another synchronous communication tool, which allows all participants to draw and type on a common screen. The contents of the whiteboard can be saved and reloaded as well as erased by anyone using it. The whiteboard can be useful as a flow chart or concept-mapping tool for visual learners. Synchronous communication is valuable but can be difficult to realize in many WBL situations. Often students chose WBL because their busy schedules do not allow them the opportunity to join in a traditionally scheduled classroom situation, which often means that the email tool gets heavy use (Digilio, 1998).

The discussion tool in WebCT 3.0 can be used to create similar collaborative groups. Collaboration is another key element in learner-centered constructivist theory. Collaborative groups help individual students understand convergent and divergent concepts. In a traditional face-to-face classroom, a teacher may foster collaboration by dividing students into small heterogeneous groups to discuss important topics. There are many creative ways that a teacher can use the discussion tool. The discussion tool in WebCT 3.0 allows you to create topic areas for discussion. Topics can be public or private. Public message discussions can be read and replied to by anyone in the course. Private topics are only available to a set of select students and teaching assistants. The critical feature of such electronic forums is that they tend to put the teacher in the role as first among learning collaborators, rather than as instructor and leader (Doucette, 1996.) The discussion feature can also serve as a scaffolding tool to direct and focus topical discussions. Electronic communication can also serve as the great equalizer, allowing quieter, more reflective learners to participate more in these collaborative learning situations.

Another way of fostering collaborative learning environments with WebCT is by utilizing the student presentation tool. Student presentations are created as HTML based web pages. The instructor can select the members of the presentation groups or WebCT can randomly select the groups of any given size. All members of the class can view the final presentation products.

Because WBL takes place with students physically separated from each other, it is important to try to create a sense of connectedness between them. We use the discussion tool to help create a virtual learning community by encouraging all participants to post an introductory statement and a picture of themselves. We post the names and pictures of our students under an icon on the opening page within the WebCT course structure. Making each student more real with a name and a face makes collaboration more personal and meaningful. This combination of pictures and written introductions also aids the visual learner. Students and professors can refer to these pictures during the duration of the course to help them make personal connections with their fellow participants.

WebCT also has a tool for the creation of student homepages. Encouraging students to create their own homepages helps foster a sense of community. Students can use their homepages to learn more about each and their shared or diverse individual interests. These homepages can also spark other, sometimes-unexpected learning opportunities.

Course Content Tools

The course content tools in WebCT 3.0 include: Content modules, syllabus, glossary, image database, calendar, index, CD-Rom and compile. WebCT3.0 allows for course content to be offered in a linear and non-linear sequence. Course content can be placed outside of the content module tool but it isn't usually advantageous to do so. Certain tools such as the compile tool, the CD-Rom tool, and the glossary tool can only be used with content that is inside the content module tool. Instructor/designers can organize these content modules in any sequential fashion they might choose. Content module materials can include text files, html files, or multimedia files and materials within a content module are set up in a table of contents. The heart of the content module tool is that table of contents. The table of contents is a hierarchical path where individual components can be hyperlinks to the subject materials, or simple organizational titles. Students who are most comfortable in a linear learning mode can simply start at the top of the path and progress downward. A student who has a non-linear preference can jump around in a hypertext mode and access the materials in a fashion that makes sense to them. A student can use the Compile tool in WebCT to reorganize and customize course materials into notes. This allows students to use the materials in a way that makes the most sense to their individual learning style. The content compiler tool then allows the student to save the personally reorganized notes and then view the notes on screen, download the notes to their computer, or print them. WebCT also has an index tool which acts like the index in the back of a textbook. Entries are listed alphabetically, with each entry having one or more additional subentries associated with it. The subentry is followed by a link to the page on

which the index entry is located. The index tool is a very effective tool for students trying to locate important concepts in the course content.

Multimedia components are yet another important part of WBL. WebCT can incorporate images, video, and audio into the instructional environment. Simple images used in instruction help visual learners and help with dual coding as well (Burton et al., 1995). Video and audio elements can be streamed which means that the presentation is viewed as it downloads and is much quicker and more time-friendly in terms of download delays for the end-user, the student. Video and audio presentations are both excellent for encouraging dual coding thus increasing learner retention of information. Two of the tools WebCT has to help display multimedia are the Image database tool and CD-Rom tool. The image database defaults to display thumbnail images for quicker screen loads. These Images in the database can be displayed with text descriptions and can be associated with keywords so the students using those keywords can then search the database. The CD-Rom tool allows multimedia elements to be presented via CD-Rom. The student's can either use a CD-Rom provided to them by the instructor for the course, or can view the contents by downloading the content from the server.

Evaluation and Assessment Tools

WebCT contains a variety of evaluation and assessment tools for the student and the instructor/designer. Student evaluation tools include the more traditional types of evaluations such as calculated, multiple choice, matching, short answer, and paragraph style tests. Evaluation has often been a controversial subject in educational theory. Current theorists do often not endorse traditional evaluations and alternative assessment methods are often encouraged. If portfolio assessment is being used as an evaluative tool, then the student presentation tool could be useful. WebCT also has an assignment tool, which lets the instructor place a downloadable file for the student to download, complete, and upload again for evaluation. The assignment could be such items as photographs, a spreadsheet you want the student to modify, or articles that you want students to reflect on and respond. Feedback is useful for any and all learning styles and WebCT has a self-test tool in multiple-choice format that gives students immediate feedback. The self-test can be placed directly with the relevant content.

The elements of good instruction require constant evaluations of content and the organization and presentation of that content. Instruction and course design are often represented by flowcharts, which emphasize feedback loops for adjusting instructional components to improve the overall course product. WebCT has two features called track student, and track page that give the instructor information needed to adjust instruction. Using these tools the teacher can answer questions such as: What pages are the students using? What pages are the students skipping or missing? Instructor/designers can use the information from track student and track page to adjust and reorganize course materials in order to improve instruction.

Conclusion

When teaching in the relatively new environment of the Internet, professors need to adapt their course materials utilizing the same foundational learning theory concepts that are effective in the live classroom. WBL just creates a new set of tools that needs to be exploited in the best way possible for the individual learner. In fact many instructors find that as they create distance learning, the same tools used in WBL such as e-mail, bulletin boards, interactive technology, and graphic designs, can enliven a classroom just as easily as they can liven up a distance student's home computer (Carnevale, 2000). WebCT 3.0 has introduced new features that allow creators if WBL environments to gear their instruction such that the appeal and effectiveness of this instructional medium can be optimized for individuals who have various styles of learning.

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MULTI-MEDIA APPROACHES TO TEACHER CONTINUING PROFESSIONAL DEVELOPMENT: DEALING WITH DISRUPTIVE PUPILS

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Abstract: Concerns about how teachers deal with disruptive pupils led to the Scottish Executive funding the development of a CDRom to be used for teacher professional development. The Project involved literature searches, field research and dialogue with teachers in schools to identify a range of scenarios and how they were best dealt with practically. The results and optimum approaches suggested on the CDRom are treated as problematic with users being presented with a range of interactive situations in video/audio and text. Teachers are encouraged to review and develop their own skills and school policy and are provided with exemplars and additional references for consideration.

Introduction

Despite losing its Parliament in 1707, Scotland remained a constituent part of the United Kingdom, keeping its character and many formal institutions. It has always had a legally and politically distinctive and autonomous education system (Greaves & O'Brien 1996; Clark and Munn 1997). The 1997 referendum determined that the Scots would once again have a Parliament and even more distinctive Scottish education initiatives are now emerging.

Policy Context

The Scottish Executive Education Department (SEED) believes that effective learning and teaching are crucial factors in school effectiveness. Improving the quality of learning and teaching in classrooms is an important strategy to help improve pupils' attainment. Schools and education authorities are being assisted in implementing a range of approaches to raise levels of pupils' attainments as part of the *Raising Standards - Setting Targets* initiative. Policy initiatives include attempts (Lloyd & Munn (Eds.) 1997; Munn (Ed.) 1999) to cater effectively for pupils with emotional and behavioural difficulties within mainstream settings and special units attached to mainstream schools.

Continuous Professional Development (CPD) of Teachers

Kirk (1995 p.15) suggests that the

> ... changes that have occurred in teacher education have to be seen as integral to a wider restructuring of education and of curricular renewal, which have made new and increased demands on teachers. We are under an obligation, therefore, to ensure that teachers are trained to enable them to discharge effectively the new responsibilities expected of them.

The Scottish Office Education Department (SOED 1992) issued a statement of the competences expected of the beginning teacher. These have recently been revised and a series of standards or sets of competences are planned for other career stages as part of a developing Framework for Professional Development. The Scottish Qualification for Headship (SQH) which prepares teachers for principalship is an example of a standards driven qualification (O'Brien and Draper 2001 forthcoming). There is clear official recognition that teacher education is a lifelong enterprise and teachers and higher education have important partnership roles to play (Sutherland 1997). Since 1985 the locus of in-service has become increasingly the school, reflecting what Hargreaves (1994) described as a move from traditional INSET to staff development and

subsequently to the concept of professional development but many teachers have taken award bearing courses offered by universities (Landon 1995). There is some evidence that for CPD opportunities the universities are regarded as offering too academic a style of provision (van der Kuyl et al. 1994), and the trend despite the possibilities of national standards and associated award-bearing courses, is towards an increased reliance on in-school or school-based staff development.

The learning organisation and school based CPD

Teacher lifelong learning in the form of CPD is increasingly regarded as an important means of contributing to the creation of more effective schools and as integral to learning organisations. O'Brien and MacBeath (1999 p71) defined the learning organisation,

> ... as a place in which there is an infectious desire to learn, to build, to exchange good practice, to problem solve together, to question the most deeply held prejudices, to be open to change and new ideas and to experiment and learn from mistakes. Leadership, culture and planning are important ingredients in the realisation of such an organisation as is effective staff development which builds on existing strengths, and individual and organisational needs.

SEED and its predecessors play a strong central role in the provision of national guidelines and centrally funded support for school-based CPD initiatives including funding a multi-media interactive disk for school based staff development coordinators (O'Brien and MacBeath 1999) who might promote and encourage learning organisations. Since the late 1980's government has supported the development of interactive technology resources to meet a range of staff development needs in schools (van der Kuyl et al. 1994). This has involved special funding to provide schools with hardware at advantageous prices and funding the development of a number of software titles. Cost effective training for staff was attractive as it might allow greater penetration of training materials, a consistency of approach and meet 'value for money' targets. Early experimentation with the technology in schools centred on the production of curriculum support materials but it was soon realised that teachers needed to be made more confident in their use of such technology and to recognise its potential. While curriculum focused materials in interactive format continued to be important, the targeting of staff development as a focus for interactive resources emerged as a strategy for extending teaching and learning approaches within schools, this is evident in the range of disks produced eg Mathematics, Health Education and Differentiation and now also in relation to dealing with disruptive pupils.

The "Dealing with Disruption" CDRom Project

The promotion of social competence and social inclusion through meeting pupils' needs in schools and classrooms and building on alternatives to school exclusion is major SEED policy. However, increasing concerns about disruptive behaviour by pupils in Scottish schools has led SEED to fund the "Dealing with Disruption" Project to research and produce an accessible user-friendly dual format [PC/Apple] CD-ROM for teacher professional development use. This involved *inter alia* researching in schools, the strategies and approaches that teachers use to deal with these problems at individual, whole class and whole school levels. The CDRom provides best practical advice, help and focus for training for teachers on managing behaviour effectively, concentrating on:

- low-level interruptions in everyday classroom situations
- challenging behaviour by individuals or groups of pupils and by parents and other adults
- whole school and departmental policies.

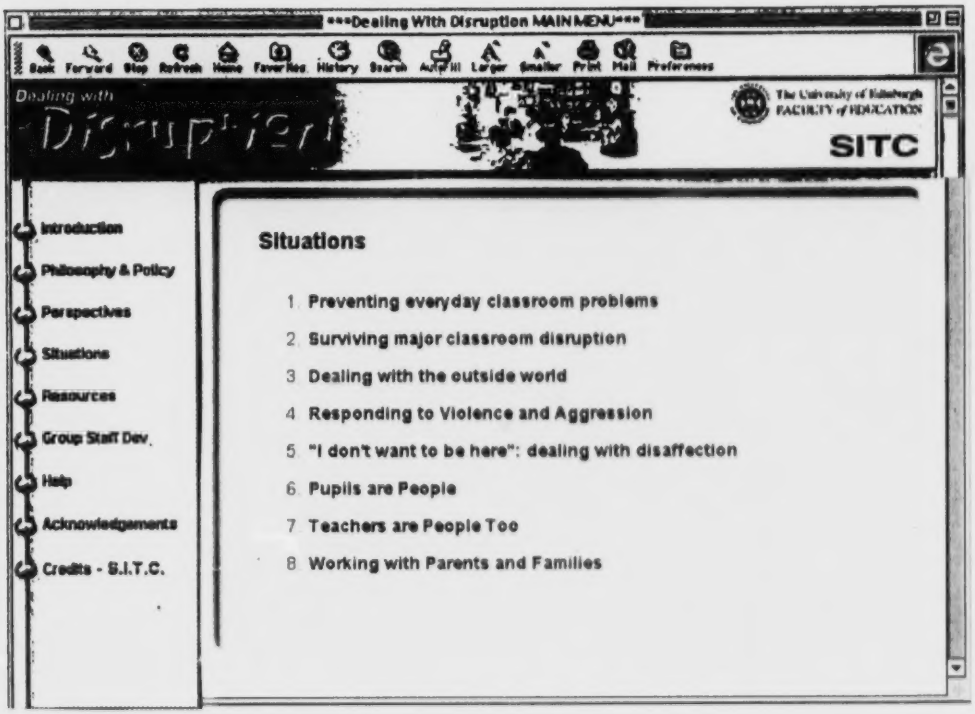

Figure 1: Disruptive Situations Menu

The CD-ROM resource

The CDRom exemplifies for primary, secondary and special school teachers effective methods for managing behaviour and dealing with classroom disruption and other forms of aggressive behaviour. In doing so, the exemplars highlight a full range of scenarios, from managing mild but persistent disruptive behaviour to addressing the needs of pupils with major emotional and behavioural difficulties. It also deals with potentially difficult situations involving parents and other adults. A comprehensive range of disruptive situation and behaviours which may be encountered by teachers in mainstream schools are considered. The CD-ROM includes a menu of situations including sequences of classroom incidents and good practice in managing the interruptions (cf Figure 1). It provides advice on avoiding or pre-empting difficult situations. The identified range of potential audiences include classroom teachers, student teachers, senior management of schools, staff development coordinators in schools, EA personnel including advisers and staff tutors, community agencies and school boards; while identified potential uses include:

- staff development for specialist staff
- in-service training for all school staff
- management training
- inter-agency training.

Key issues for the development team included taking account of the diversity of backgrounds of the target audiences including ICT familiarity and expertise; the need for training materials to be interactive, flexible, of the highest quality and using multi-media on CD-ROM; the possibility for written resources, if disk space allowed, to be downloaded by users and the potential migration of the materials to Internet format in the future. The final product is written in 'browser' mode to facilitate such transfer.

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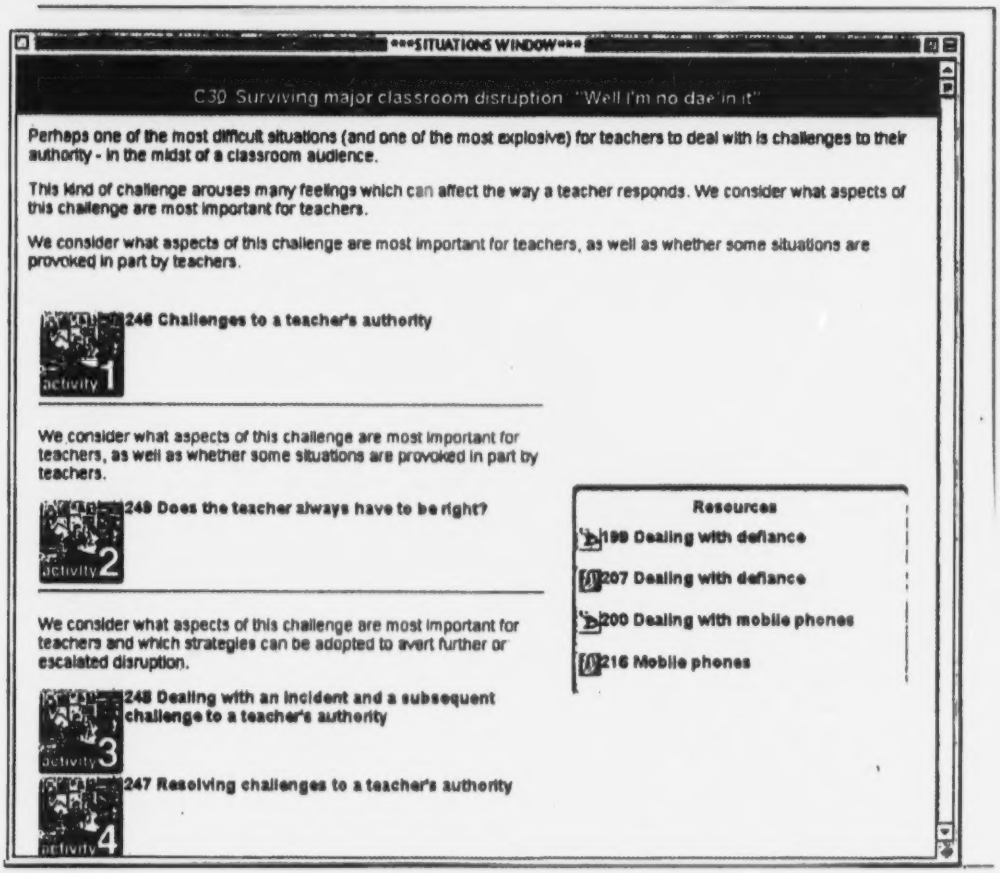
SITUATIONS WINDOW
C30 Surviving major classroom disruption "Well I'm no dae in it"
Perhaps one of the most difficult situations (and one of the most explosive) for teachers to deal with is challenges to their authority - in the midst of a classroom audience.
This kind of challenge arouses many feelings which can affect the way a teacher responds. We consider what aspects of this challenge are most important for teachers.
We consider what aspects of this challenge are most important for teachers, as well as whether some situations are provoked in part by teachers.
246 Challenges to a teacher's authority
activity 1
We consider what aspects of this challenge are most important for teachers, as well as whether some situations are provoked in part by teachers.
249 Does the teacher always have to be right?
activity 2
We consider what aspects of this challenge are most important for teachers and which strategies can be adopted to avert further or escalated disruption.
248 Dealing with an incident and a subsequent challenge to a teacher's authority
activity 3
247 Resolving challenges to a teacher's authority
activity 4
Resources
199 Dealing with defiance
207 Dealing with defiance
200 Dealing with mobile phones
216 Mobile phones

Figure 2: A Typical Sub-Menu Illustrating Interactive Activities available

The product developed has a core of exemplification materials in text, audio and video formats (cf Figure 2) to provide advice and strategies relating to:

- whole school approaches
- positive ethos and reward systems
- departmental and individual responsibilities
- classroom approaches.

Project methodology and approach

Drawing on good practice, the disk illustrates

- identified common principles in dealing with disruption
- comprehensive management strategies for dealing with disruption
- a range of teacher skills and behaviours derived from current knowledge about dealing with disruption and identified good practice

and provides suggestions about sources of support which will help individuals and schools deal with presenting issues while recognising the diversity of approaches.

Many recent publications contain case study examples of whole school and whole class approaches in this field. A literature search revealed publications with illustrations of work with individual children/young people with social and emotional behavioural difficulties. In addition to trawling recent advice and publications key individuals and organisations with direct knowledge of school and classroom practice

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were engaged. Existing materials and resources, including video, dealing with the management of disruptive behaviour were identified and reviewed. The most useful material was cited in the resource which also built on good practice and experiences from other initiatives which promote positive discipline and the development of social competence.

Project Phases

Complimenting a search and evaluation of existing materials and packages in this field and a literature review, the *field research phase* involved a team of professional field officers managed by key university researchers who visited primary and secondary schools; these visits were focused and areas of investigation including schedules of inquiry were developed and agreed in advance by the Project team. Discussion with headteachers and teachers identified effective classroom practices. Case studies based on such practices were prioritised and agreement reached with practitioners to video classroom practices and secure copyright clearance.

The *concept development phase* involved the identification of an appropriate curriculum design for the proposed CD-ROM and included scripting, scenario and interactive materials development. Resources required were identified or confirmed at this stage. Discussions matching screen design and formats to curriculum design and intentions were significant. This phase was iterative, formative and responsive to the quality and richness of video, audio and text assets realised so that the final product was optimised. Several approaches were developed only to be abandoned in favour of simpler more economic designs which encouraged sensible navigation through the resource.

The *asset production phase* involved co-ordination of professional and technical staff who produced video/audio case study materials and scenarios. Activities, text commentary and feedback were produced which closely matched the collated case studies and exemplified the strategies adopted. The commentary provides background to the situations illustrated and highlights the methods adopted to manage them. Advisory material in the form of text enables visual sequences and activities to be cross-referenced to more detailed information on methodology.

Technical production of the CD-ROM including all programming, engineering, de-bugging and beta-mastering was completed by 31 December 2000. Evaluation in a limited number of schools began in February 2001, this is designed to test the product in the field and provide a final check of curriculum and technical standards before production and dissemination.

The *dissemination phase* will commence in September 2001 and involve distribution of the completed CD-ROM to all Scottish schools in association with 25 national conferences.

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TEACHERS' PERCEPTION ABOUT THE TEXT-TO-SPEECH TECHNOLOGY

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Abstract:
As the computer technology rapidly advanced, the text-to-speech function, or the synthetic speech, has matured on the Macintosh computers. Most computer users, though aware of the existence of such a technology, did not have real hands-on experiences with it and did not hold positive expectation on it. The current study examined the perceptions of teachers as well as of other people in non-education related field toward the use of such a technology. The results showed teachers' perception changed after they had been exposed to such a technology.

Teachers always look for innovative ways to create activities using available resources. Current computers have come with the text-to-speech function (or the synthetic speech) which may be used to enhance teaching and learning. Many current reading and writing programs and authoring tools, such as Hyperestudio, KidWorks, Storybook Weaver, KidPix, and others, have integrated the text-to-speech function as a part of the essential built-in features. The text-to-speech feature can be easily used in some word processing documents. After text is entered or selected, the sound or speech command from the program can accurately produce authentic speech. Currently the text-to-speech application is also available in Spanish. In addition, the synthetic speech can simulate different voices to represent different personalities. The text-to-speech function may allow various potential uses in the classroom and is worth exploring.

While the synthetic speech has provided a great potential for instruction, it has not been researched for its usefulness to computer users as well as how it may be effectively integrated in education. The purposes of this study aim at the following.

- Investigating how familiar teachers are with the computer text-to-speech function.
- Examining teachers' perceptions and attitudes about the computer text-to-speech function; comparing teachers' perceptions and attitudes towards the computer text-to-speech function before and after they have been exposed to a few teaching and learning activities using the text-to-speech features.
- Comparing teachers' perceptions and attitudes toward the computer text-to-speech function with people from other non-education professions.

Methodology

One hundred thirty seven preservice and inservice teachers who registered in a computer literacy course were surveyed (or pre-tested) for their perceptions about the text-to-speech technology at an early stage of the course. These teachers were then introduced to features of computer synthetic speech and various instructional activities designed specifically for the use of the text-to-speech functions. They were surveyed again (or post-tested) to see if their perception towards such technology had been changed. These teachers were then assigned to interview three non-education related people to find out about how other people perceive the usefulness of the computer text-to-speech function. The written reports of their interview results was collected and analyzed.

Results

- There was no significant difference between preservice and inservice teachers. One hundred nine preservice teachers and 28 inservice teachers who registered in the computer application courses participated in this study. The preservice teachers, in general, were younger and more computer-literate than the inservice teachers. Seven inservice teachers reported that they had some prior experiences using the Macintosh computers. Others reported that they had only Windows computer experience. The results of the pre-test showed that there was no significant difference between the preservice and inservice teachers' attitudes and perceptions toward the computer text-to-speech functions.
- Most teachers were not familiar with the computer text-to-speech functions. As shown in the pretest survey, all the preservice and inservice teachers had heard of the computer synthetic speech function. However, only four teachers had some prior working knowledge and experiences with it. Most teachers did not have any idea of how to generate speech based on typed text on a computer. Several teachers expressed that current Windows-based computer did not provide an easy text-to-speech function. This is evidenced by the fact that most teachers were Windows users.
- Teachers' initial ratings about the usefulness of text-to-speech function were low. In the initial survey, before they were introduced to the synthetic speech functions and activities, neither inservice nor preservice teachers gave a high mark for the text-to-speech function.
- There is a significant difference between teachers' pre- and post-test results. Most teachers were amazed by the sophistication of the synthetic speech while they learned about the nearly authentic speech generated by the Macintosh computers. They were also surprised to learn that computer can read sentences like "I love to read and I have read many books", where the word "read" may pronounced differently under different grammatical context. The paired t-test results showed a statistically significant difference between teachers' pre-test and post-test [$t(272) = 3.41$, $p < .01$]. Most teachers began seriously engaged in developing ways of integrating synthetic speech technology after they had some hands-on experiences.
- The attitudes and perceptions of synthetic speech from people in non-education related professions were similar to those of teachers prior to their taking the computer literacy course. After learning ways to integrate synthetic speech into teaching and learning, participating teachers were assigned to interview three people that were not in the teaching profession for their opinions toward the synthetic speech. Altogether, opinions from 411 people were collected and reported. After comparing these opinions, we found that teachers' initial perceptions and attitudes toward the computer text-to-speech technology were very similar to those of people from other professions. Most of these people that teachers interviewed had no experience in using the synthetic speech and 327 (80%) of these people suggested that the synthetic speech was a useless device to them. Also as reported by participating teachers, most of these teachers agreed that their perceptions and attitudes towards computer synthetic speech were similar to those of non-education people. They considered it basically an add-on feature for fun or specifically designed for people with special needs. However, after teachers were exposed to several synthetic speech enhanced learning activities, they became aware of the value and power of such a technology.
- Some valued the synthetic speech more than others. The basic information about interviewees' gender, age, and occupation was collected. The results of the analysis showed that there was no significant difference between people of different gender and age. Not everyone would truly value the computer text-to-speech technology. Among all participants in this study, the typical groups that considered the synthetic speech function useful were teachers, people with vision or hearing problems, young children, and ESL students.

Summary

New synthetic speech technology has provided a great potential to serve instructional purposes. Such a potential, however, was generally neglected. The results of this study showed that most computer users, including teachers and people in non-education related fields, were aware of the existence of the synthetic speech technology, but were not familiar with it and did not value it for its usefulness. The results also showed that teachers' perceptions toward the synthetic speech changed to become more positive after they had been introduced to the use of such a technology. This study suggests that teachers are likely to adopt the synthetic speech technology and put it to use in effective instruction if they were properly introduced to such a technology.

The Enhanced Instructional Presentation Model

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Abstract: In this document we describe the Enhanced Instructional Presentation (EIP) model for the development of educational hybrid linear/hypermedia presentations. Our proposed EIP model addresses the learners' needs for organized and synthesized content while providing for individual differences in background experience, learning orientation, and cognitive abilities. The EIP model is an instantiation of van Merrienboer's 4C/ID model (1997).

Learning from linear presentations.

Linear presentations (expositions, demonstrations, activity sequences, etc.) are efficient from the perspective of the instructor and the institution. They aim to maximize the overall learning effects for a target audience by identifying the state of understanding and needs of the average learner and building the content to meet those needs. Presentations are often well polished and moderately effective for large portions of their target audiences.

Unfortunately, for some learners, this industrial model does not work well. Because the intended audience is an amalgamation of learners, any given presentation will include varying amounts of content redundancy or delay in progress for some learners and insufficient content or time for other learners.

When viewing film or video, learners tend to become passive or adopt a "learned helplessness" (Flanagan, 1996). Even with programmed activity sequences, learners know from experience that they will not be able to process all of the content, reconcile every contradiction or explore all perplexions in the allotted time. If they allow themselves to be distracted by any portion of the content, their inattention to the new content and structures being presented will likely cause them greater confusion. The learners' conditioned response is to become a passive receptor of content whenever the pace of information exceeds their ability to cope.

That linear presentations are often partially effective for the majority of the target population is only a testament to the resiliency and capacity of the human mind. Learners can store up content (information and experiences) for later reflection and learning. Yet we suggest that this is an inefficient process with uneven results depending on the individual learner's capacity for storing and recalling presented content and access to additional resources (supplementary experiences, books, experts, etc).

We are suggesting the EIP model as an alternative model that will allow the learner unlimited real-time opportunities to view, review and process content (accretion), reconcile contradictions (restructure), and reflect and improve their understanding (fine-tuning) (Rumelhart & Norman, 1978).

Questions and Tutoring.

Constructivism tells us that individuals have different backgrounds and understandings, and will have widely varying needs for supplementary explanations and examples (Bruner, 1966). Aristotle suggested that our learning is composed of question answer propositions and Dillon claimed: "No event better portends learning than a question arising to the mind"(Dillon, 1986). Yet student generated questions are typically scarce in the industrial model of education. Factors limiting the use of questions in the classroom include social constraints, limited time and limited background knowledge. Even when questions are asked, they may be different from the students' real questions, or laid aside because they are too marginal or too difficult.

Individualized tutoring has been demonstrated to be a near ideal learning situation yielding two standard deviations of improvement over traditional instruction (Bloom, 1984). Learners lacking sufficient conceptual understanding or verbal confidence to enable them to form or present adequate questions are prompted and led in the direction of the intended learning outcomes. Learners lacking in self-direction, or needing to overcome a learned passive response, are encouraged and prompted with options frequently. Unfortunately, it is not feasible to provide every learner with unlimited live tutoring.

As an alternative to tutoring, the EIP model facilitates the learners' use of their own intelligence to choose paths through a synchronized network of supplementary content in order to meet their individual needs.

The EIP model

If a good educational presentation is like a fine string of pearls, then an Enhanced Instructional Presentation puts that fine string of pearls, along with access to any supplementary information needed, into the hands of the learner in order to ensure full appreciation.

The EIP model has four main components:

1. The traditional linear presentation
2. The playback control which allows the learner to pause the presentation, skip back and review earlier concepts, skip forward over redundant material and control the presentation sequence through a table of contents.
3. The supplementary content is synchronized with the traditional linear presentation to provide a short list of "just-in-time" and "as-needed" material that may be selected by the individual learners. Each piece of supplementary content might be augmented with a further short list of supplementary materials allowing the learners to continue exploring until their questions are satisfied. (thus creating the network of supplementary content)
4. The feedback and interaction mechanism is adjustable to meet the needs of individual instructors, researchers, and/or students. Feedback opportunities could include assessments, surveys, access to the instructor via email, and access to a related web pages and discussion forums.

We are in the process of developing a tool to support the development of EIPs. Once completed, the construction of an EIP will involve three main activities:

1. Collecting and generating original and supplementary content segments in the form of quicktime movies, powerpoint presentations, text files, images, audio clips, simulations etc.
2. Constructing a control matrix, using a spreadsheet, that specifies the names (or URLs) and descriptions of all of the content segments along with arrays of appropriate links between segments and some simple control variables.
3. Constructing a feedback page for the learner to access additional content, communicate with other learners or the instructor, access formative or summative evaluations, etc.

Some examples of how the EIP model might be used:

a. A lecture of a mathematical proof with a supplementary network of prerequisite skills, explanations of "the obvious", potential applications, related theorems, etc.
b. A narrated example of a physical education activity, supplemented with descriptions of the rules as they are applied, basic strategy and alternative strategies, focused training exercises, access to related web sites, etc.
c. A pre-service teacher report on a classroom observation with a supplementary network of their comments related to the activity observed including: discussions on pedagogical issues, management issues, reflections etc.

The EIP model we have described is a hybrid, combining a polished linear presentation with playback control and a synchronized, hyperlinked network of supplementary linear and hypermedia segments. By adding the strengths of these two instructional media modes we hope that Enhanced Instructional Presentations will promote more efficient learning for individuals.

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A School-University Partnership Model for Developing Student Technology Leaders

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Abstract: *Multimedia Masters* is unique a school-university partnership of student "consultants," teacher "clients" and university "experts." The year-long project begins with a development day to collaboratively set goals for the year, and four remaining sessions, two on the university campus and two at the district, assist students with meeting these goals. Each session focuses on developing technical, pedagogical, mentoring, and reflective skills. At the end of the project, students present their finished multimedia projects to parents and school administrators. Year 1 achievements include students learning to communicate more effectively, think critically, and reflect upon themselves as learners, in addition to increased technical skills. Teacher clients expressed increased interest in using technology both personally and within their curriculum. Challenges during Year 1 and areas to improve for Year 2 involve student time commitments, more effective teaching of the teacher clients, improved communication with the district technology team, and more effective structuring of session activities.

Professional development remains a pivotal requirement for successful technology diffusion among classroom teachers. Quality professional development opportunities are difficult to design and maintain so that they provide customized training at the level each teacher requires, as well as immediate reward and learning applicability for each teacher's students. To that end, *Multimedia Masters* is a partnership that was forged between the University of Houston College of Education and Spring Independent School District in Spring, Texas. Recognizing that student technology leaders are in abundant supply and possess ready enthusiasm for multimedia development, the ongoing goal of the project is to develop a cadre of technologically and pedagogically skilled middle-school students who can assist the technology development of their teachers. This brief paper will establish the project design, technical issues, strategies, achievements, and future goals of this model project so that others may consider a similar solution.

Development

Multimedia Masters students are 8th graders who apply for a "special experience" extracurricular opportunity. If selected, student teams invite a teacher whom they have had in the past to be their "client" throughout the year. Students work with their clients, special experience teacher leaders, and university Instructional Technology faculty to learn the necessary technical skills to transform the content material into quality multimedia learning products for the teacher clients to use with their students. A parallel goal of the students is to teach their clients the technology skills as they learn them.

The year-long project begins with a development day at the district with students, teachers, teacher planners, and university faculty to collaboratively set goals for the year, which for Year 1 included proficiency in reflection and planning, mentoring, pedagogy, and technology. Four remaining sessions, two held on the university campus and two held at the district, are planned by faculty members and teacher planners, with regular student input, to assist students to meet these goals.

Activities

Throughout the year, students keep reflective journals of team and teacher relations and personal accomplishments. Students work closely with their teammates, learning together and mentoring each other on technical skills, and all participants brainstorm approaches for students to work with their teacher clients. A portion of each session focuses on developing technical skills, including productivity tools, multimedia formats, and website design and development. Students practice teaching skills by planning and teaching technology skills to university preservice teachers, as research findings have shown that students acting in teacher roles tend to demonstrate accelerated growth in social skills, confidence building, communications skills, and critical thinking. The culmination of the project involves students presenting their finished multimedia projects to parents and school administrators.

Challenges

The project faced several technical challenges in Year 1. There were software incompatibilities between the University and school computer labs. The K-12 labs presented further difficulties with downloading and filtering restrictions. The entire group attempted to move beyond the "coolness factor" of technology to get students to think about how technology can be used to solve problems and communicate new ideas.

Achievements

At the conclusion of Year 1, *Multimedia Masters* can boast of achievements on a number of levels. Along with using technology tools to create teaching materials for their teacher clients, students learned to communicate more effectively, think critically, and reflect upon themselves as learners. Student participants described increased technical skill, confidence with teaching, and positive experiences working with team members. Teacher clients overwhelmingly expressed an increased interest in using technology both personally and within their curriculum. A vital partnership developed between the district's technology and curriculum departments as a result of facilitating the project, and other classes in the district were able to make use of the multimedia materials for student learning. Finally, university faculty members took advantage of the authentic learning experience for their future teachers.

Goals

As successful as the first year was, we unanimously identified areas to improve for Year 2. Students had a great number of daily extracurricular commitments, making meeting with teachers and team members challenging; we hope to work with them to better organize their time. Students often created learning products and simply gave them to teachers; we will help students better meet the technology learning goals of the teachers. Challenges with technology are expected to continue, but the project team plans to improve communication with the district technology team. The faculty members hope to retain a constructivist, student-driven atmosphere, while at the same time better structuring the session activities to use time efficiently. A final long-term goal is connecting the teachers in this project with real content providers, a concept currently being explored within in the graduate IT program.

A New Approach - Situation Learning (SL)

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Abstract: The presented solution offers a new approach to knowledge module presentation that is different from the majority of presently used approaches. The interactive component of the SL approach increases students' involvement and motivation for learning. Learners can experiment and investigate within the 'virtual world' of the SL knowledge module. Such experimenting and interacting with different knowledge presentations makes it possible to construct own specific knowledge thus making the factual knowledge more permanent.

Situation Learning - General Description

In the field of Web based learning, numerous attempts have been made to use hypermedia for learning in many different ways. In the first half of the 90s, many scientists have already stated (Maurer92),(Maurer93),(Lennon94),(Elliot95) that hypermedia can be used as a cognitive tool for learning, and have also outlined a number of other potential advantages that hypermedia systems offer. Among the researchers of hypermedia use for education, the following basic questions were proposed: How to design effective learning opportunities? Why is learning by experience very often more efficient than learning by studying? How to provide the learning experiences needed to respond to current challenges?

As reported in (Biljon99), Haque (Haque, Evens & Michael, 1987) emphasised that many students, in spite of possessing the required amount of knowledge, are unable to effectively utilise it and apply it to solve problems. The aim of SL is to facilitate the knowledge presentation and thus to improve the learning process. Using SL for educational purposes two primary aspects of the learning process are supported:
(i). - learners are encouraged to combine knowledge from different areas to chose a solution or to make a decision at a certain point,
(ii). - learners can test how the pathways and outcome of the situation change based on their decisions.
David reported (David97) that there is an increasing demand for greater interactivity to be built into learning materials. SL knowledge modules provide a complex level of interactivity that stimulates users engagement. In SL knowledge modules, different interactivity concepts are (and can be) applied, as object, linear, construct interactivity and hyperlinked interactivity. Also some simplified non-immersive contextual interactivity and immersive virtual interactivity can be applied in the general concept of the SL.

A Situation Learning knowledge module can consist of one or more related situations. The term "Situation" in the context of Situation Learning denotes a specific simulated environment in which the learning objective is embedded. The situation is a collection of different scenes that are related in the sense that they describe a certain event or task. The users are offered some context dependent possibilities or possible courses of action. Based on previously acquired knowledge and described scenes, users make a choice and move on to another scene within a situation. The "scene" consists of several hypermedia and HTML documents (e.g. on request available additional information). The displayed hypermedia document consists

of an image, video / audio, text, meta-instruction and for example four selections. Only a few possibilities (in general 2-6) are offered to users. Based on users chosen courses of action, they then proceed to the next scene and eventually to the end of the situation e.g. summary. Each consecutive scene is different and depends on the previously made choice. By being confronted with the consequences of chosen course of action, users can stepwise construct the feedback on their choices made. With the help of the "virtual" world users can explore where a chosen course of action could lead them in the "real" world. In the same way, users can safely explore possible outcomes when less appropriate choices are made. Using SL knowledge module, users get the opportunity to learn appropriate responses for different situations / cases. Such opportunities enable users to improve their ability to discern relevant from irrelevant information and to combine unrelated (or less obviously related) elements. The interaction provided within each consecutive step, encourages users to think about the case and to reflect back on their own knowledge base. Based on this they make a decision. In this way SL effectively facilitates the decision-making process and helps users to understand and evaluate their choices.

With interactivity and stepwise constructed feedback there is a support to students' productive thinking and promoting subconscious or incidental learning. Feedback helps users to build a new picture about how much they know about a certain topic and if they can use the acquired knowledge within a certain situation. SL can influence users' awareness in terms of what the users think they know. Being able to build their own picture of the knowledge mastered increases users' motivation for learning. Consider an example: when reading a book with an interesting topic and good structure, the reader will have a feeling of having understood everything. But later, when confronted with a specific problem, the reader might want to use the theory and facts he/she acquired from the book in order to solve a specific problem. At this point at the latest, the reader will realise that although he/she had a feeling of having understood the content at the time, he/she did not memorise enough to be able to formulate a solution i.e. to use the acquired knowledge. Based on such experience it becomes clear that in order to solve a problem conscious learning and a deeper level of knowledge has to be achieved. Or as the (Queen99) expressed, *"Failure is motivation for learning"*.

Through the process of applying the knowledge acquired learners can build their own mental concepts e.g. can check the understanding of the material learned within the concept. Situation learning may bridge the gap between isolated learning of theory and practical work i.e. applying theoretical based learning to a practical situation. Situation learning is a way of facilitating the natural learning process, whereby the successful acquisition of new facts is enhanced by the learners ability to consolidate this information with their own knowledge base and experience. Such links allow people to master very complex or seemingly unpredictable situations. Situation learning helps to build and improve learners' mental model.

Theoretical Background of the SL

From the didactical aspect SL knowledge modules can be used also to increase the dynamics of learning hence SL knowledge modules are less formal and have completely different approach compared to regular hypermedia used for Web education. SL can be placed in the group of didactical programs. Such programs are characterised by their interactivity, adaptability, and additional explanation on request and the possibility to test the acquired knowledge.

SL uses constructivist learning approach where each learner constructs their own individual world and learns how to manage problems within this world. Using SL knowledge module learners are active participants in knowledge acquisition. Learners can experiment and investigate within the 'virtual world' of the SL knowledge module. Such experimenting and interacting with different knowledge presentations makes it possible to construct own specific knowledge thus making the factual knowledge more permanent.

"Situation Learning" is a similar expression to "situated learning" but should not be mistaken for it. Although both approaches do emphasize that learning should be meaningful to the domain and contextualised, there are also significant differences between these approaches. Situated Learning is a general theory of knowledge acquisition whereas SL focuses on knowledge utilisation. In the SL approach knowledge is primarily acquired by means of individual learning. In SL, in contrast to situated learning, the emphasis is on knowledge utilisation and development of mental models based on acquired knowledge. In

SL users construct their own personal approach to problem and task solving. With the help of the simulated situations learners have the opportunity to create and experiment with so-called different scenarios of behavior within the situation. The behavior reflects the learners' understanding of different theoretical topics, their ability to connect interdisciplinary knowledge and to utilise it in a proper way e.g. to solve a problem or to offer help. Transparency of such systems enable learners to understand sequences of the whole process. Furthermore, learners have to define the problem area, use several different sources of information to justify their decision reasoning and use the support of technology to process their inputs. The aforementioned activities encourage interdisciplinary thought and action that is similar to the situations we get confronted with in real life.

Educational Aspects of SL

In contrast to traditional linearly oriented learning, there are other possibilities for learning for example incidental learning, often called implicit learning (Holzinger99). For the learning process, motivation is a very important factor. Therefore learning programs should be entertaining and challenging to get the learners' attention and give them motivation at the same time.

SL knowledge modules contain both elements, entertainment and challenge. High content interactivity stimulates user's engagement and mental involvement. Higher levels or attention and motivation of learners can facilitate learning. In the SL knowledge module learners use a chosen course of action to directly influence the development of the situation. The principle of constructed feedback in the form of different possible pathways and situation outcomes has some similarity to adventure games and contains other principles of edutaiment (Al-Ubaidi00). (Quinn99), (Lepper92) have shown that enhanced learning (which is fun) can be more effective. Using some simple educational tasks, they demonstrated that learning embedded in a motivating setting improved learning outcomes.

In the SL microworld there is a direct relationship between action and feedback. On one hand students can influence the situation development with their decisions. Based on courses of action taken, students proceed from scene to scene. When arriving at the end of the situation at the latest, students obtain feedback in the form of a summary with a thorough explanation of results or behaviors that were expected of them. With the help of information obtained within scenes and partially with the help of information provided in form of a summary which is a concluding scene of a situation, students can construct the whole experience of "actions taken and consequences". Students can get feedback after the session also in form of the computer LOG file, where they can see their pathway and analyze chosen courses of action. This feature gives students, in conjunction with the feedback, the possibility of assessing their own activities to see how they were doing and to be able to more objectively evaluate their decisions / courses of action. Feedback could be provided in different representation forms and could also be used for students overall performance evaluations.

Being able to see students' overall performance and the development of their decision making process the teacher or tutor can effectively test if the learning material was understood. If the content was understood differently, analysis of chosen courses of action and pathway evaluations provide the information required to identify where the problems occurred, e.g. in what context students' performance indicate a misconception. With help of this information the system or tutor can suggest to students a list of additional topics that could be beneficial for acquiring additional knowledge.

Use Cases

In order to present the value of the SL knowledge module in practice, several application examples of the SL knowledge modules for learning are outlined in this chapter. The SL knowledge module approach could be applied to stimulate students' involvement, fight boredom and increase retention. This approach could be applied for different representation of a particular topic or to demonstrate the application of the theory.

Example 1: An SL knowledge module could be created to depict how different parameters influence the ecological balance within the environment.
The ecological balance could easily be disrupted by an inconsiderate action. Namely, before wastewater is released back into the waters outside the plant, several parameters have to be checked according to the legal regulations. The temperature, pH, the quantity of biologically decomposable elements, presence of halogen element, should all be controlled and regulated, along with many other factors. When the regulations have not been followed, irreparable damage to the environment could occur. Even if the water is not contaminated but is released back into the water source too hot, micro-organisms, plants and fish could be killed. However, if the water is contaminated, the consequences are much worse as pollution could take place.
Within the SL knowledge module the procedures for chemical engineers when handling the wastewater could be discussed. Students should be confronted with cases of differently contaminated wastewater. Students should have the possibility to choose an industrial sector. Related to the industrial sector defined, specific cases should be created. Based on knowledge of regulations, testing procedures, and prescribed handling in the case of overly polluted wastewater, that has previously been acquired within the course, students can choose one of several offered courses of action. In each scene students are stimulated to think hard and decide which course of action is the most appropriate. Within the next scene students can see the result of their decision. Based on the result, students can see if it was the result they expected or if another decision could be better. If students are not satisfied with the result, they could apply a plausible corrective action and check the outcome with the help of the next scene, and so on. When working through the situation, students can explore different behaviours like what would happen if they were to take actions according to predetermined decisions. In the worst case, they could cause water poisoning and jeopardise the living in the whole area of the "virtual world".
Students can work through the SL knowledge module several times to improve their performance and to encounter different cases offered. Within the described SL knowledge module, students can access numerous theoretical details and explanations available in the course background library. To repeat and acquire additional knowledge students could also 'switch back an forth' between SL knowledge module and the rest of the courseware.

Example 2: Application of SL knowledge module to teach history could bring the possibility to present the life in the past from different perspective. There is a variety of very good movie materials that depict different historical periods from the past. Although the materials are very good and interesting, they do not support active participation of students. When watching a movie, students have the role of observer, whereas SL knowledge module makes it possible to be an active participant. Students could interactive explore different historical periods when they build villages, cities, and infrastructure. Within the knowledge module, a rich collection of pictures and video-clip sequences could be available. Students could have a possibility to build and decorate a typical house of a particular era. Among different domestic and decorative objects offered, that were used in different time periods, students should collect appropriate objects for a specific era.
Active participation of students in activities like collecting objects, building and decorating houses, also provide support for haptic learners that memorise and learn better when they have an opportunity to interact with the learning material.

Example 3: Another possible application of the SL knowledge module for teaching chemistry could be for making experiments with toxic chemicals in the "virtual world". The initial scene of the knowledge module could be in form of a task where an experiment should be executed. Different stages of the experiment could then be presented within several scenes of the knowledge module. Students would have to plan the experiment: resources, chemicals, etc. They would have to check which equipment is needed for the experiment, when the laboratory and the equipment is available, make calculations of chemicals needed, etc. In another situation within this SL knowledge module, students could prepare all of the equipment needed for the experiment and arrange the pieces to put everything together as necessary. When the equipment is arranged properly and everything else is prepared they could proceed with the experiment in the safe - virtual environment. Students should be aware of proper procedures, like not to put water into sulfuric acid because this might cause a turbulent exothermic reaction or how to react in case where part of their skin comes in contact with strong acid.

In the aforementioned knowledge module a variety of interactive paradigms could be applied, like object interactivity, clickable image maps, choosing courses of action, writing calculated parameters and quantities, etc.

The pilot project LIFE, based on the SL knowledge module application, is presented as a part of the medical server in Austria (www.infomed-austria.at). The goal of the project is to educate the population in the areas of fitness, stress regulation and nutrition, in order to increase the common awareness of the importance of these factors on our lives. SL modules were created for knowledge mediation in each of the topic areas.

Authoring of the SL Knowledge Modules

It is relatively easy to design and produce the SL knowledge module. It does not require any additional programming skills, apart the basic knowledge of HTML page creation. The course production requires minimal cost and relatively short development time that is justified with the applications benefits and many varied uses within learning. The authoring is divided into the following topics: software engineering approach, importance of the scenario, proposed interface structure, and existing authoring support, including any authoring difficulties that arose.

When developing an SL knowledge module software engineering principles should be considered. Though the SL is different from a conventional program, there are certain parallels that can be drawn. Designing the SL application, in the first step the learning objective is defined e.g. presenting certain facts, comprehension testing, etc. In the second step the situation (story setting) is defined in which the learning experience along with a possible solution will be embedded. In the third step each scene and connections between them is described in a scenario. With the help of a graph and table the knowledge module structure is illustrated. In the implementation phase, the situation author or the programmer makes the hypermedia documents based on the scenario.

A scenario contains a detailed description of the situation, different situation developments i.e. scenes with all screens and multimedia. To enable the production of a learning knowledge module, e.g. situations where a detailed description is needed, the teacher or knowledge module author should write a scenario where each particular scene is described. Based on this description the programmer or media producer is able to make the product without the knowledge of the whole knowledge module or didactical / methodical co-relations. The scenario production takes more that one third of the courseware development time.

Each presented scene of the situation can be divided into four main areas as follows.

Meta instruction	Situation description
Possible courses of action	Media display

In general the entire left side of the screen is intended for the user interaction. The right screen side gives information about the scene e.g. description, media, links to pages with additional data, ect.

On one hand, authoring is facilitated with the templates for scenario and hypermedia content production, on the other hand, smaller-less complex situations can be re-used and embedded into more complex content. Three levels of SL authoring supports are defined as follows: (i) - authoring supports for facilitating the scenario writing with templates for scene description, (ii) - authoring supports for visualisation of the described situation and connection between scenes, (iii) - authoring supports for facilitating the hypermedia document production with the use of templates (Dreamweaver SL Extensions).

In more complex situations e.g. adaptive situations, the author can find it becoming increasingly more difficult to keep an overview of the situation and possible connections to other scenes or situations. Therefore the present authoring tools should be developed further to support the scene production based on the semantic structure defined by the author or the expert. The possibility should be given either to follow the path along one choice or to describe the key scenes, define levels and then to define the different pathways connecting the levels.

Conclusions

The main purpose of the SL knowledge modules is to offer the opportunity to apply the knowledge acquired thus making it possible to indicate a deficiency in understanding or a misconception. Therefore, a connection to other specific learning programs can be provided to make it possible for students to acquire factual knowledge. SL knowledge modules can also be connected with other programs like Mathematica for learning mathematics, or a program for learning a foreign language, etc. With help of such programs students can explore details or acquire some specific knowledge. For instance in Mathematica students can receive help by calculating integrals, or carrying out other mathematical operations.

It is evident that the major benefit for the learning bring the SL knowledge modules when being offered within an on-line learning environment. Users can profit from the different perspective that knowledge modules are providing, and at the same time from the rich annotation and communication possibilities offered within the learning environment.

Acknowledgements

The pilot-project LIFE was carried out with the financial support of Fonds Gesundes Österreich.
A part of my doctoral studies was made possible with the financial support of Slovenian Ministry for science and technology.

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Session #435

Corporate Demonstration
Improving the Use of Media in the Classroom

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Emerging technologies continue to change and improve the landscapes of our classrooms. Computers, Internet, and video have played a large role in changing how students learn. One way to integrate the use of emerging technologies is to enhance older and proven methods of instruction. Schools have created video libraries to augment and improve student retention for years. Now, using a combination of computer software, high speed network access and large screen classroom monitors, teachers can quickly access and control a large cadre of video media, without the past burden of hardware set up and scheduling. ETR, Educational Technology Resources, Inc., provides a software product to assist teachers in using media in the classroom with ease--the product MediaMaster. Whether traditional media or digital media, MediaMaster allows teacher to rapidly deliver video content with ease and confidence.

New Teachers and New Technologies

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Abstract: A key moment in emancipating the teacher from the physical limitations of the classroom and encouraging a sense of collaboration, cooperation and collegiality would be introduction of principles and responsibilities of electronic collaboration. Teachers have to be introduced to Internet, electronic mail, news-groups, list-servers, bulletin boards and other means. By those, they can act jointly and communicate with colleagues near and far. They should be acquainted to online resources and the means of connecting and using them as well as contributing to them. In this paper, I will try to outline a learning model that will succeed in such education of a teacher.

Introduction

The perception of computer assisted learning is shifting from its current position as an optional extra in our fund of course components, to that of a key teaching medium. Learning with computers is a multi-layered, interactive experience. Interactive multimedia is defined as a computer tool that includes a combination of text, graphics, sound, video, and animation sequences packed together (see Lee 1996). With the growth of the World Wide Web, this becomes widely available to more and more people every day, forming a visual/audio presentation of information and knowledge. It can be successfully used to support education and training, to serve as a reference tool and to provide dynamic presentation. Traditional "textbook learning" is one component for learning a subject, laboratory projects provide actual experience, but only multimedia and WWW can synthesize and expand the learning process. With the advent of the WWW, education has a new tool to utilize. It offers the ability to easily distribute educational material around the globe. Also, with a web implementation of educational material, changing the content is trivial, and students need not be made aware of such changes. Facts supporting this, are studies showing that people retain 25% of what they hear, 45% of what they see and hear, and almost 70% when they actively participate in the process (see Myers 1990). Moreover, additional effort that professors may and should incorporate into creation of lessons and courses using WWW and multimedia "offerings", will help in personalization of these lectures. How much this is important, can best be described through findings in (see Goldstein 1997) that: "98% of students receiving individualized instruction, outperform those receiving computer-based training." Even WWW browsers themselves, overcome many of the shortcomings of traditional computer-based learning by affording platform independent, easily updated training materials. Personalization and adaptation to individual student is performed through their profiles and through planning software. As individual lesson components are selected, many of them are adapted to student, based upon constraints attached to the materials, and those "attached" to the students' profile. A student's performance with using materials, in turn, updates his profile.

There's one interesting observation that can be made in connection with the usage of WWW in education. Hypertext organization and interconnection of Internet, confirms to a nonlinear form of presenting information, in which interlinking modules of related information are associated to a central topic. The associative links allow instant access to any of the modules, enabling cross-referencing and browsing. On one hand this confirms to a structure of a World Wide Web, while on the other hand is akin to the manner in which the human mind works to gather facts.

Teachers should be taught not only how to use web, but also how to contribute back to it - how to author for the web, integrate graphics, create links and produce useful content. For some time now, this process - "authoring", has been described as "the design and production of computerized multimedia learning materials", carried out by a single person - the author. This perhaps has never been completely true, although the early authoring systems for computer-based learning did seem to assume that teachers

wanted to and could produce their own teaching material. Besides, there is a view that the wide range and quantity of material now available on the Web, electronically, make possible the notion of "student as an author", searching the Internet for material to incorporate into a multimedia "story".

Although both notions contain a lot of truth, there is one specific point in authoring process I would like to emphasize. Despite the decline in costs of equipment, the cost of the time of those involved in production of learning material, remains high. And, not only remains, it goes higher and higher. To "author", teachers themselves need time to become familiar with the technology, understand the instruments and experiment. Provision of articles for teachers through news-groups or list-servers incorporates and advocates collegiality and stimulates thoughtful and profound discussions. Besides, as teachers are in some extent expected to act as a scientists, it is interesting to suggest a usage of a "collaboratory", or a virtual laboratory created by the means of world wide web (see Cerf 1993): "... center without walls, in which the nation's researchers can perform their research without regard to geographical location - interacting with colleagues, accessing instrumentation, sharing data and computational resource, and accessing information in digital libraries." Educational reform calls for a drastically different kind of teaching - one that asks school to move from lecturing in whole class instruction to the facilitation of learning in small group collaboration and interdisciplinary projects. IF learning takes place in classes that are collaborative, supportive and inclusive, *more* students can contribute and participate in their own learning.

Another important point is a need for "re-training" of teachers in some areas concerning WWW-based teaching. Most professors come to "multimedia teaching" with traditional teaching experience and find that the theoretical-based assumptions that worked successfully in face-to-face instruction, do not translate well into technologically mediated education. This retraining should initially focus on moving the teacher from the podium to the sideline, from teacher-centered instruction to student-centered. Once this is achieved, the following retraining components can encompass redesign of lessons, continuous and proper usage of technology and integration of interaction in the course content, as few of the first needed changes. During these, a teacher and a student (or students) can have a non-contiguous dialog, exchanging information and ideas, questions, assignments, feedback, etc.

Learning Model

It's been argued (see Winn 1992) that a strength of the free interaction with virtual scenes and Internet is that it gives children - and we add, teachers - the opportunity to explore the same place repeatedly, building their understanding. Besides, as an educational tool, WWW has little in common with the teach-test-correct model of a "traditional" computer assisted learning, providing opportunities for children to construct their individual learning.

A teaching-teachers model should be developed for effective training for lecturers, not only on how to use Internet but, more important, on how to include these technologies into everyday teaching practices. They have to be trained how to be "knowledgeable end-users" AND "creative builders" of learning experiences on the Internet. Yet, with a rather high pace of new developments emerging, training model should drastically reduce the learning curve and enable fast application and retention of skills gained.

More often than not, training concentrates (and emphasizes) on discrete skill development, while in a certain manner "ignores" practices that enable user to increase an understanding of the relation between the training and use of acquired knowledge in the classroom. In contrast to that, (see Kinnaman 1996) advocates one different approach: "Teachers don't need to be "trained". They need activities that engage them with the process of teaching - activities that encourage them to explore, create and reflect upon the benefits and limitations of teaching with technology". In other words, teachers are now being asked to examine thinking and learning process; collect, record, and analyze data; formulate and test hypothesis; reflect on previous understandings; and construct "subjects' own" meaning. Good teachers are constantly making decisions and formulate ideas about goals of education they are "giving". Those ideas must not ever be conclusive - after the initial formulation, those decisions and ideas are subject of careful reconsideration in light of newly acquired knowledge and techniques, in light of information from current theory and practice, from feedback, and from contemplation about social and ethical consequences of their results.

Training is usually given in a form of providing information that may or may not have relevance and importance to the end user. Instead, a good learning model should be made highly meaningful and personalized to the individual teacher, encouraging usage of skills that can be implemented easily and promptly in the classroom. The intention is to enable teachers to think consciously beyond just adopting new skills, automating, simplifying or duplicating current teaching practices. They should be able to reevaluate, reexamine and reconsider teaching in the light of the new skills and produce original learning actions that display these qualities. Still, every step of the way, teachers should be allowed broad opportunities to practice their skills in meaningful activities. This will assist them in accomplishing the greater goal - creation of a project, a teaching plan, a subject curriculum, that shows evidence of the teacher having rethought a lesson in the light of newly adopted skills and technologies. Consecutively, as the skill level increases, authority over one set of skills leads to introduction of the next one. This progress is derived through a proposed learning model, consisting of:

- determining objectives for the training;
- outlining the elements of a training content;
- creating the activities for successful practice;
- inventing a system for evaluation, and
- devising a reward system.

Course Outline

The usage of Internet services becomes an essential part of teacher training. The education profession should realize that this is not some futuristic and frightening development, but merely an extension of the kind of responsibility that schools have long accepted for helping children to be discerning in their use of other media, and to develop skills and judgement in relating to others and caring for themselves.

Given elements of learning model should be adequate to include teachers into a "team" of successful technology users. As always - learners need to approach a subject in more than one way to move from surface knowledge to substantive, in-depth understanding. Here, we will outline elements that should characterize the "course":

- teachers are given the freedom to create their products and give them meaning in their own manner, while implementing the skills they have learned;
- teachers are clearly informed that the trainer's role is only to provide the training concerning the necessary skills, while their creative implementation, are their own responsibility;
- teachers are introduced to different methods of exploring technology - searching the web, gathering relevant data, collecting information on a given subject and similar;
- the trainer uses prepared materials and live demonstrations to teach data acquisition, analysis techniques and scientific principles;
- the necessary real-time interactions between trainer and student/teacher go far beyond standard conferencing - they must be able to work collaboratively and interactively;
- some practices require teachers to use data "hidden" somewhere in the web to make calculations and suggest some conclusions based on these calculations;
- course uses an integrated set of communicating tools such as electronic notebooks, (video)-conferencing systems, shared screens, information-access tools and similar, to the extent when they become a regular part of everyday tool for teachers;
- the course should facilitates scientific interaction between teachers by creating a new, artificial environment in which individuals interact;
- a lot of newly adopted information processing skills are used in creative ways to learn new, or re-learn old concepts through interdisciplinary connections;
- while advocating the use of technology takes time, the schools are also obligated to reward teachers initiating those changes within their schools;

While the need to interact with others is an inmate tendency, that most teachers possess when they begin working in education process, the introduction of technology that will mediate in this interaction often hinders and delays that tendency. Therefore, it is essential that course includes such kind of

technological instruction, coupled with periodic question and answer sessions, which will assure that the interaction will persist and will include both pedagogical and social attributes.

At the same time, several strategies that will enforce constructivist and inquiry based teaching, include these:

- Accepting and encouraging teacher initiation of ideas and thier questions;
- Using open-ended questions and encouraging teachers to elaborate on their ideas;
- Encourage teachers to test their own ideas, answer their own questions, hypothesize causes, and predict consequences; and
- Encouraging self-analysis, collecting data to support ideas, and reforming ideas in light of new experiences and new evidence.

Although new technology addresses shortcomings in current practices, it is obvious that the "higher" the technology is, the more limited is the access and the more knowledge is required for its' usage. Integrating the use of Web into education, however, has more to offer than simply faster and more convenient communication for those who have access. By preparing a study guide that takes advantages of what the Web has to offer, a more interactive experience can be offered to students, stimulating their motivation, curiosity, learning and dialog. Success of those highly depends of teachers' reactions. For example, successful dialog via e-mail, depends on the instructors' rapid response to students' questions and comments. At the same time, teacher might want to suggest taking certain discussions to a more open forum, where more students could participate - from forwarding e-mail messages to conferences.

Conclusions

The fusion of computers and electronic communications has the potential to dramatically change and enhance the quality and "productivity" of schools and faculties. Still, a technology often exists without being used because it is perceived as adding little or no value (see Kouzes 1996). While we claim that the time is right for "collaboratory" solutions helping the scientific and teaching interactions, we still have to make it a necessity for systematic and methodical progress, psychosocially acceptable. Today's modern technology allows for interactivity between student and instructor to take place in many formats - starting with simple e-mail messages, and going all the way "up" to teleconferencing, interactive video, conference calls, or CUSeeMe, being just some of the possibilities. It is important, therefore, for the interactivity to move beyond brief encounters between student and teacher and to invoke a feeling of togetherness between them, between students themselves, and finally between student and the material being studied.

Increased usage of Internet in the classrooms has been reported through the professional publications. Momentarily noticeable advantages of the Internet-based training are the integrated communication capabilities, connecting people, and the use of the huge content already on the Web. Besides, it allows flexibility of the time and place to study, and even enabling flexibility of changing the content and supplying of additional resources, without students being even aware of that. While, in the past, relatively slow adoption of newly introduced technologies into the classroom usage was acceptable, today, all over the world, daily practices of both teaching and learning have been enriched with these in unusual and never seen rate. New technologies, with easy-to-use interfaces, allow both students and teachers to access, develop, make use of, apply and donate to the Internet world of information. They can also add to the world of relevant, applicable and meaningful information, communicate and collaborate with colleagues worldwide and "escape" from formerly separate and disconnected world of isolated classrooms. This chance must not be overlooked and neglected in our schools and our teachers have to be trained to use contemporary resources and technologies and engage the students and pupils in the learning process by making them active partners.

The revolution caused by Internet is providing much needed motive and impulse for large-scale technology implementation into our schools. More importantly, research shows (see Ainge 1997), that interest remains high even after a long time usage, almost without any significant sign of reduction. Even without funds needed for complete computerization of every classroom in each school, we must be able to use wealth of information offered, knowledge and experience "funds" applicable in our environment.

The use of Internet, electronic mail, newsgroups and other elements of electronic communication for supporting classroom instruction is still in its beginnings. However, this innovative method has great potential in enhancing traditional teaching methods. Applied correctly, it can prepare teacher to bring

breadth and depth to subjects being taught, provide efficient use of class time, create flexibility in teaching and enhance student's learning. Examples of Web based teaching (see Hidalgo 1996) show successful implementation of Web-based, multimedia teaching at MIT, used for extending communication beyond the classroom. It allows teacher to post information on the Web both for subject review and for subjects not covered in class. It is also sucessfully used for easy monitoring of student progress and student interactions in bringing critical discussions on the course.

Internet, WWW and their other services, are here to stay and become inevitable part of childrens' everyday lives. Initial usage of it by teachers and their incorporation of courses should prepare both children and teachers not merely to know something about them, but to think about how best it might be used in classrooms and, generally, in society. If teacher educators do not act soon, or if teachers themselves do not take a challenge, teachers will miss a unique and brief opportunity for having a possitive impact on children in this field. Besides, in a few years, teachers will be almost unable to catch up with their students on issues and concerns that they should incorporated in teaching practice some time ago.

It might seem therefore that we, as educationalists, have little choice but to become "Internet surfers", picking up interesting and useful items which can be downloaded and used with our students, or to buy the CD-ROMs we can afford, in the hope that there is within them items which can be helpful in meeting our classroom aims and objectives. But, what guarantees do we have that there will be useful material there? We cannot expect the contributors to WWW to follow goals and objectives, which we see as important. We, as teachers, lecturers, or professors must take that responsibility. We must select and organize, guide ad instruct our pupils and students to use what we can make available, in a way that we find will be educationally profitable. This, in some sense, turns us into authors. As teachers, we play not only "organizing" role, but while creating lessons, we also design and produce original material for them, often making changes as we go along. This material will be directed towards achieving goals used to provide structured learning environments and help improving learning altogether.

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Hypertext Flexibility in a Web Learning Environment to Promote Extensive Reading Activities in School Learning

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Abstract: This paper describes a study in progress aimed at secondary school students of English as a Second Language, concerning poetry as a possibility for extensive reading activities, supported by an hypertext approach to the design of the learning environment.

Introduction

Poetry has been a challenge for English as a Second Language (ESL) teachers and students. The former evaded the issue by simply not using poetry in their classes and the latter were quite content in not having to deal with texts that they considered "difficult" (Lazar, 1993; Ur, 1996).

The aim of this in progress study is to understand the importance of the hypertext flexibility in the design of web based learning environment to the literary text and mainly the use of poetry in the second language learning process in every level of teaching as a possibility to be taken into account in the domain of extensive reading activities.

The design of flexible, collaborative and open learning environments directed to building up knowledge in straight relation to the subject's own pace and the user's needs has its roots in the educational approaches of social construtivism and situated learning.

The change in the design of new learning environments is shown through the flexibility of the learning processes, the multidimensional exploration of the learning materials, a personal and collaborative commitment in the learning goals and the working out of a individual and collaborative strategy for knowledge construction and experience (Spiro et al., 1995; Jacobson et al., 1996; Romiszowski, 1997; Collis et al., 1997; Dias, 1999, Rogers, 2000).

The Study

The research design is a qualitative based analysis of the student learning interaction and understanding of poetry text through the hypertext and hypermedia support of flexibility and contextual learning. This goal is provided by an hypertext based learning environment, that offers to the student the possibility to explore the dimensions of meaning construction, through associated links to words and images. This associated web of links perform a dynamic view of multiple texts, and suggest a deeper understanding of the internal relationships of the poetic text.

The hypertext based learning design allow students to produce a reconstruction of the poetic text, through the changing and introduction of new words or images to the original poem, composing a personal view that incorporate the choices performed by the student, during the extensive reading activity.

To implement it the research design includes a web based learning workshop in reading poetry and a discussion forum to promote the sharing of personal understandings among students.

The flexibility of hypertext in constructing the representation network is closely related to the construction of meaning in learning. The construction of meaning is a dynamic process, as well as the

arrangement of hypertext nodes; meaning develops through the relationships between nodes (Borsook,1997:724).

This approach doesn't regard the learning process as an acquisition of knowledge externally organized and separated from his contextual framework. Furthermore, it stresses the importance of contextual building up of knowledge representations in learning, which is supported by the creation of a web of links among the informational materials of the hypertext representation. The educational hypertext is based on non-linear information organization that allows the user to choose his own individual or collaborative paths on a network, configuring it to his learning needs, previous knowledge and learning goals. The hypermedia approach was particularly innovative in terms of training since the hypertext doesn't only *display* the information but it *works out* as a dynamic web of representation.

In order to test this possibility, one class of twenty students, aged between fifteen and eighteen, in a large urban secondary school in Porto, Portugal, was selected to have classes on poetry as a part of their extensive reading activity. As in the Portuguese syllabus poetry is not included in the list of options the students have to fulfill this activity, they were given the possibility of working with several poems during the school year, in order to read a poem by e.e.cummings and from it to produce several different readings of the same poem using web based learning environments.

Conclusions

Results from the survey study shown a deeper involvement of students in suggested reading activities, namely: i) the high level of interaction dedicated to the exploration of the poem; ii) the construction of a personal understanding of the suggested poem using the associated links of words and images to produce the individual view; iii) a strong feeling of participation in the activities of reading and developing a personal and collaborative understanding of the poem; and iv) a positive attitude to the challenges of the exploration of the multidimensionality of the meaning in an hypertext based environment.

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StageStruck - Technologies For The Performing Arts

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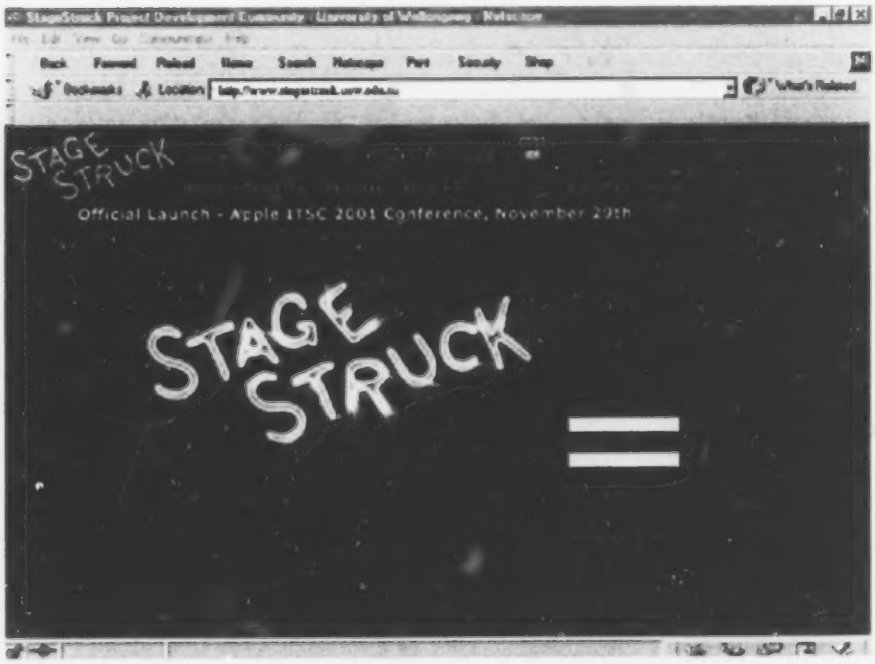
Abstract: This session will demonstrate the first phase of a research study to examine the role played by Internet-based teacher professional development in the implementation of an innovation. The innovation in this study is the software application (*StageStruck*) for the performing arts. The professional development web site has been developed to support inservice teachers in best practice use of the software. The StageStruck CD-ROM and web site community (http://www.stagestruck.uow.edu.au) will be demonstrated in this poster session.

In this first phase of development the web site portal has been established to build and support a community of practice in the performing arts areas of learning. The web site development has been an iterative process based on an understanding of best practice in professional development, a review of the literature and exploration of cases available in and about on-line communities, and the contributions and ongoing evaluation of our community members (teachers and students).

StageStruck Professional Development On-line Community



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StageStruck - Technologies For The Performing Arts

StageStruck CD-ROM

" The winning choice is a project so all-encompassing in its objectives and execution that it represents a pinnacle of co-operation between art, culture, education and New Media. In addition to impressive content, the technical goal of creating an educational experience for the 12 - 18 year old age group is achieved in a highly relevant and inventive way". This is how the judges of the International Gold Emma Award described StageStruck.

StageStruck, produced by Wollongong University and National Institute for Dramatic Art (NIDA), was launched on 29 January 1999. It is recognised as an innovation in the teaching of performing arts. It is an innovation both as a multimedia technology for performing and creative arts teaching and learning. (StageStruck won BAFTA and EMMA awards in 1998 for educational interactive CD-ROM technology). More importantly it has been recognised as a pedagogical innovation because of its constructivist underpinnings and design realisations as a multimedia knowledge construction tool (Hedberg & Harper 1997).

Students can take on the role of directing a performance through the selection and manipulation of actors, actions, scripts, sound effects and set design elements or become involved in backstage exploration activities learning more about what goes on 'behind the scenes'. This product allows students to interactively create and display the production of scenes from classic plays and or build new performances to share with other users of the package.

StageStruck introduces the learner to the world of performing arts by exploring a performing arts venue (the Sydney Opera House) which showcases contemporary companies. performances, processes and people, and provides theatres and "tools" with which to design, build and direct soundscapes, costumes, sets, scenes and performances.. The StageStruck project sought to focus on the construction of multiple meanings in a field that many would argue is highly subjective and open to numerous interpretations. This field of performance enables the student to construct their own ideas about a script and how it might be performed.

By extending the boundaries of interactivity in the context of a virtual setting, learners are provided with opportunities to express their own cultural interpretations and understandings. In this theatrical journey there is the advantage of working with many visual metaphors. The world of theatre, opera, music theatre, dance and contemporary performance styles can be explored through devices such as "The Green Room" where the user can investigate a database of the contemporary world of performing arts. The "Stage" space provides the opportunity to view sample scenes from productions which have been created by professional directors, and, more importantly, to individually direct and design their own scenes with access to the same theatrical elements. In this process individual users explore processes of visual design, sound development, and the concept of direction and motivation. In this project the construction tools have also been extended to enable the user not only to collect from a defined set of resources, but also to construct their own resources based upon combinations of sets, costumes and performers.

Key to the communication of the experience within this application is the facility to save, share files between learners or re-present your constructed performance and interpretation to others located within the same classroom or across the Internet with other learners from different cultural backgrounds. This last act offers the potential to create a range of resources that are not bounded by the storage capacity of a prepackaged CD-ROM but are collected and shared from an ever growing unbounded Internet learning environment. StageStruck like many other technological innovations needs to go through a diffusion process to reach implementation. The on-line community is seen as an effective and cost effective way to realise professional development.

StageStruck Professional Development On-line Community

The StageStruck Community has been designed to support K-12 teachers in their classroom use of StageStruck. The free community offers access to mentors, training, projects, curriculum resources, lesson plans, or the chance to 'buddy-up' with an international school to swap design idea and projects. The site offers professional development, support and resources for teachers as well as activities and projects for students. Subjects such as script writing, set design, costume design, sound effects and stagecraft are explored in an interactive and fun way. Targeted at the busy teacher who wants to use StageStruck in his/her teaching but needs that 'kickstart' - or

to extend the existing user who wants ideas for more sophisticated projects or have student works critiqued by experts in the performing arts field.

The site will grow and develop over time as teachers in the community contribute ideas, resources and develop their own projects. Participants in this interactive session will have the opportunity to discuss aspects of teaching in the performing arts with peers on-line in a number of countries. They will also be able to register their students in the writing and development of an episode of on-line serial to be started in February 2001 or propose and initiate a new International project.

The study will define the role that Internet technologies can play in the change process. Since traditional face to face professional development has been found to be very costly and less than effective in fostering and sustaining change, innovators are looking for new means to both improve the quality of teaching and empower teachers to shape the future of their own learning. One of these new means is Internet-supported communities of practice or networks. The time has never been better for a study of this nature, to show what is possible in an electronically and cognitively networked environment.

Detractors might complain that the technology is just not available or friendly enough yet for teachers to see it as a mainstream tool. This claim will very soon be easily refuted. The access to technology has grown rapidly. Australia is not alone in its efforts to offer schools high speed and effective bandwidth connections to the Internet. Most Australian state's school systems have agendas and priorities for the coming years that firmly position information and communication technologies near the top of the list.

The study's findings will be of significant specific interest to

- Educational multimedia product developers
- Curriculum developers
- Educational leaders
- Teacher training and development officers,

and indeed any educationalist considering the alternative to mainstream professional development.

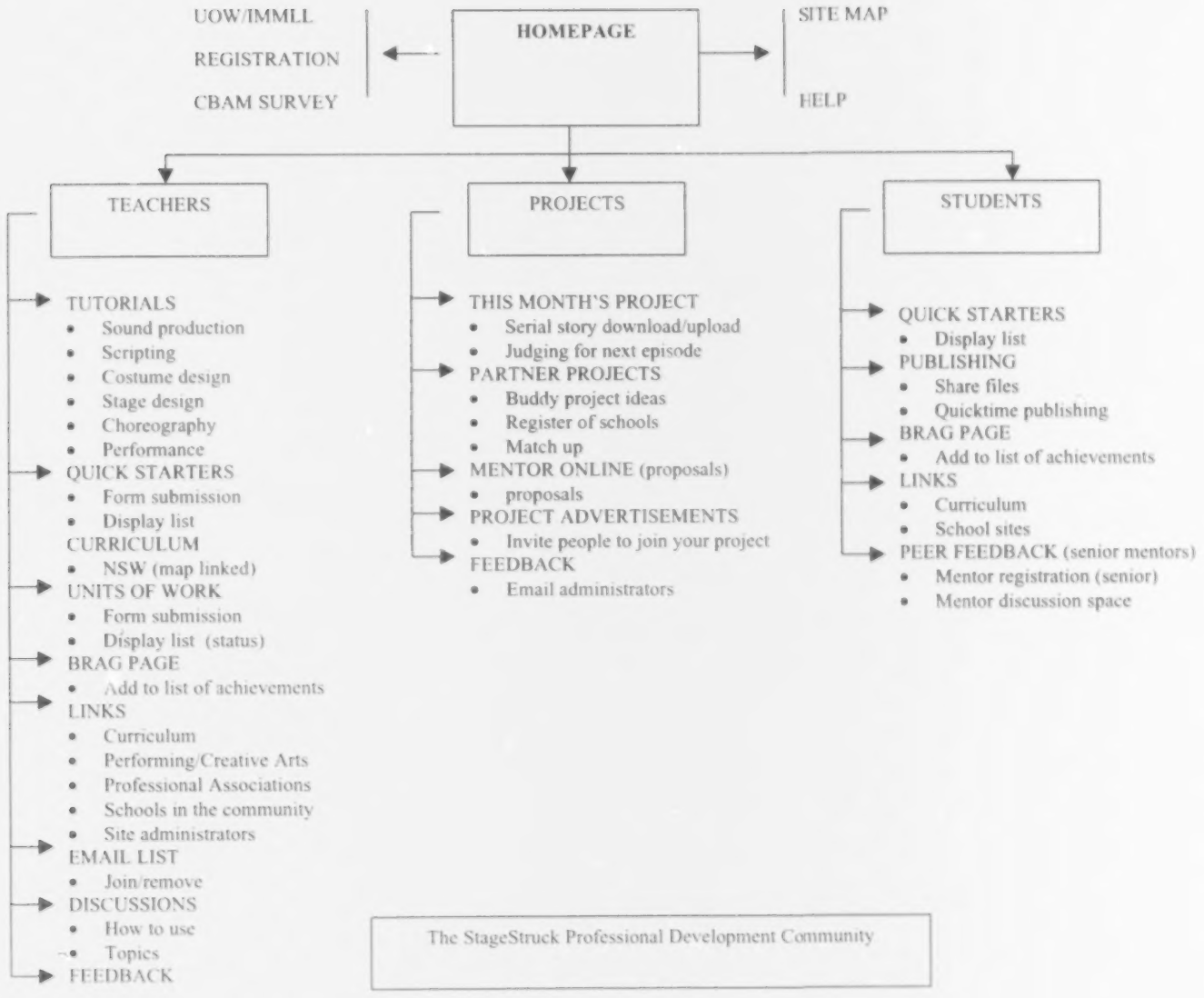
Session Objectives: The session will involve demonstration and hands-on activity with the StageStruck CD-ROM and On-line Community. An accompanying paper is presented for this conference Professional Development On-line - Doing IT Pedagogically. The paper allows teachers to see the theoretical background to the CD-ROM and the web site. The poster session will allow teachers to further explore both media products and to order or purchase copies of the software.

Through this session participants will be able to:

1. Understand the constructivist nature of the StageStruck program design
2. Make explicit links from StageStruck to classroom activities and curriculum in the middle years of schooling and learning areas related to the performing arts (drama, dance, set design, costume design, stagecraft)
3. Explore hands-on the design and construction capability of StageStruck in a fun collaborative task
4. Join the on-line community to support the use of StageStruck and performing arts teaching
5. Contribute to an International discussion related to an aspect of school based performing arts.
6. Explore collaborative opportunities in International projects as part of the web site community

Proposed Participants: Teachers interested in aspects of the performing arts (dance, drama, stage design, script writing, and costume design) in elementary and secondary schools will find this a unique and valuable product and session. The session itself will be targeted to the middle years of schooling bridging student ages from 9 to 14 years, while the web site and CD-ROM for StageStruck are of value to a wider school education community. The product is a cross-platform development and will be equally valuable to users of MAC and Windows computer platforms.

Experience Level: Participants will require no computer specific experience. You are encouraged to attend the session in pairs to work together through a fun collaborative task.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HOMEPAGE
SITE MAP
HELP
TEACHERS
PROJECTS
STUDENTS
TUTORIALS
Sound production
Scripting
Costume design
Stage design
Choreography
Performance
QUICK STARTERS
Form submission
Display list
CURRICULUM
NSW (map linked)
UNITS OF WORK
Form submission
Display list (status)
BRAG PAGE
Add to list of achievements
LINKS
Curriculum
Performing/Creative Arts
Professional Associations
Schools in the community
Site administrators
EMAIL LIST
Join/remove
DISCUSSIONS
How to use
Topics
FEEDBACK
THIS MONTH'S PROJECT
Serial story download/upload
Judging for next episode
PARTNER PROJECTS
Buddy project ideas
Register of schools
Match up
MENTOR ONLINE (proposals)
proposals
PROJECT ADVERTISEMENTS
Invite people to join your project
FEEDBACK
Email administrators
QUICK STARTERS
Display list
PUBLISHING
Share files
Quicktime publishing
BRAG PAGE
Add to list of achievements
LINKS
Curriculum
School sites
PEER FEEDBACK (senior mentors)
Mentor registration (senior)
Mentor discussion space
The StageStruck Professional Development Community

Learner Self-efficacy, Attitude, and Utilization Patterns for an Electronic Textbook

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Abstract: The use of electronic textbooks is increasing. The spectacular growth of the electronic learning space that is accessible through the computer, CD-ROM, DVD, Internet and World Wide Web has impacted a traditional form of mediated instruction, the expository printed textbook. With the digitization of information has come an evolutionary societal change where electronic publishing increasingly supplements (and some would argue eventually supplants) the printed text. A pilot study of learner self-efficacy, attitudes, and access and utilization patterns are addressed using graduate students in instructional technology. This pilot study was initiated to discover areas that could impact an expanded study on factors influencing the use of electronic textbooks.

Introduction

Presentation of societal and cultural values and the evolution of instructional methods have focused on the printed textbook. McClintock (1992) has suggested that Western education has had 500 years of stability which can be attributed in large part to the printed textbook, "The reason for the underlying stability was rather simple: throughout it all, the character and limitations of printed textbooks remained substantially fixed, the keystone of the system." (McClintock, 1992, p.2). Chamblis and Calfee (1998) have noted the importance of printed textbooks in the United States. They identify textbooks as (a) providing 75-90% of instructional content and instructional activities, (b) filling a need where teachers lack comprehensive subject matter or curriculum design expertise, (c) serving as a surrogate for a national curriculum, and (d) serving both as subject matter authority and as an instructional program.

The paradigm of the "book" is changing. The spectacular growth of the electronic learning space that is accessible through the computer, CD-ROM, DVD, Internet and World Wide Web has impacted a traditional form of mediated instruction, the expository printed textbook. With the digitization of information has come an evolutionary societal change where electronic publishing increasingly supplements (and some would argue eventually supplants) the printed text. Electronic textbooks offer several advantages over expository textbooks. Some of these advantages may be derived from comparison with the economics of electronic journals (Odlyzdo, 1997). For example, from an author's perspective electronic textbooks provide advantages of scholar-controlled publishing, which implies editorial control of content and presentation. Electronic textbooks publication costs are negligible compared to print media, which makes them easier to revise, thereby improving the currency of the information presented. For the learner using an electronic textbook, advantages are not clearly apparent in the literature.

Pilot Study

In a pilot study nine graduate students in instructional technology were assigned readings in an electronic textbook (Misanchuk, et al, 2000). The electronic textbook met the four criteria suggested by Horney and Anderson-Inman (1999) for defining an electronic book: (1) electronic text must be presented to the reader visually; (2) software must incorporate a "metaphor of a book" to some significant degree; (3) software has an organizing theme or instructional focus; and (4) if other media incorporated in the electronic book, they are secondary to the

text. The electronic textbook use in this study was delivered on CD-ROM. The electronic book is essentially linear allowing navigation from the current page to the "previous" or "next" page. Other navigational aids include a Table of Contents that was maintained to the left of the text. Some pages have sub-menus that allow links to sections providing more "elaboration" of the textual material. The hypertext nature of the textbook was familiar and not a problem for the pilot group. Graphics, some with animation, were used to explain specific concepts within the text.

Although all the students in the pilot study had considerable experience with electronic text, and with various forms of electronic text delivery, none had previously used an electronic textbook. At the beginning of the course students were given a questionnaire to measure self-efficacy beliefs with regard to access, utility, and navigation of an electronic textbook environment. The questionnaire was adapted from an Internet self-efficacy scale developed by Joo, Bong & Choi (2000). Studies have linked learners' attitudes and preconceptions toward media as a positive predictor of learning outcomes. (Al-Khakli, & Al-Jabri, 1998). As might be expected from our group of "expert users," graduate students in instructional technology, as a group their confidence was high with regard to their ability to access and navigate information in an electronic textbook format, even though they had no prior experience.

Students were given the opportunity to open-ended questions regarding what each user saw as advantages and disadvantages of the electronic textbook. One purpose of the open-ended questions was to help discover differences in user attitudes that could possibly serve as the basis for constructing evaluation instruments for an expanded study. The students were also asked to rank their perceived advantages and disadvantages as minor, major, or critical. By a ratio of 3-to-1 the students preferred a traditional printed textbook to the electronic textbook. The disadvantages most often cited a being major or critical were (1) text on the computer screen is harder to read (eye stress, slower reading, and requires scrolling), and (2) less text on each screen and hyperlinks interrupted the flow of the content. Although disadvantages were identified over advantages 2-to-1, the major advantage was that the electronic textbook's use of color, animation, and hyperlinks aided understanding of the text. (However, one student commented that the use of hypermedia was under utilized.)

This pilot study posed the following questions to the students in a focus group setting: At the conclusion of the course did the attitudes of students using an electronic textbook change with time and familiarity with the delivery system? What utilization patterns (printing hard copies, transferring electronic textbook material to word processing files, methods of note taking) did the students employ? Would you assign an electronic textbook for a class that you would teach in the future? What changes are needed for electronic textbooks? The results of the focus group are categorized (readability, content navigation, interface design, use of multimedia, etc.) and reported. Experiences with the electronic textbook and user attitudes were surprisingly uniform within the focus group.

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Digital Video: What Should Teachers Know?

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Abstract: Texas State Board for Educator Certification has published new technology application standards for teachers who want to be certified, including teachers of technology. The standards require that teachers should know how to create digital video products for a variety of purposes and audiences and use them in multimedia applications. Other states may follow soon. This paper discusses the difference between traditional video and today's digital video, including streaming video; examine the current technology in digital video; provides a step-by-step guide on how to create digital video; provides teachers with practical suggestions of how to create digital video economically and effectively.

Introduction

In the year of 2000, Texas State Board for Educator Certification published a new set of standards for all schoolteachers in Texas, including teachers of technology – Technology Application Standards (TAS). TAS lists specific standards of digital video knowledge and skill requirements for teachers, especially teachers of video technology. TAS requires that teachers should know how to create digital video products for a variety of purposes and audiences and use them in multimedia applications and presentations (Technology, 2000). Prior to TAS, Texas had already had in place technology application standards called Technology Applications Texas Essential Knowledge and Skills (TEKS). TEKS is the standards for evaluating K-12 students' knowledge and skills in computer-based technology, including digital video. Now with the publication of TAS, the requirement for digital video for teachers has been raised to a new height. Other states may soon have the same requirements, like TAS, for teachers in public schools. Therefore, teachers around the country are facing a challenge for knowing how to create and use digital video technology.

Most public schools today receive certain amount of money from state and/or federal funding. The funds have largely been used in the building of computing infrastructure such as computer lab and computer network (Golden, 1997). However, the ultimate purpose of computing infrastructure is for computing applications. Without application the infrastructure would be a house without residents. Using multimedia has been one of the major applications (Slaughter, 1998). Some teachers and students are using digital camera to capture images and use them in their multimedia presentations and web publications. Nevertheless, digital video is still not a reality for most teachers due to the cost on computer hardware and software, the cost on digital video cameras, and the complicity of capturing and editing video, and the lack of knowledge on equipment involved in digital video creation and the knowledge and skills on how to create digital video. To meet the challenge, a good knowledge on digital video technology, equipment, computing hardware/software, and the skills of capturing and editing video will be a must. The purpose of this paper is to help teachers acquire a fundamental understanding and knowledge of digital video technology.

Why Digital Video?

Video has been around in our life for a few decades. The development of video technology came from the need of television industry to store, edit, and replay broadcasting content, allowing the industry to step ahead from the only "live" broadcasts (Lozano, 1997). Traditionally, individual images consisting analog signals are recorded onto magnetic tapes in sequence. Those individual images are called frames in video jargon. It is by projecting a certain number of frames on a screen, such as TV screen, that we can see motions

similar to our real life. There are several standards developed by different countries as to how many frames can be projected per second (*fps*). Professionals call frames per second as frame rate. Video frame rate is between 24*fps* and 30*fps* depending on the standard adopted. Also different standards adopt different scan lines on the screen. For example, NTSC (National Television Standard Committee) system uses a frame rate of 30 *fps* (or, more precisely 29.97 fps) and 525 horizontal scan lines, whereas PAL (Phase Alternating Line) system has a frame rate of 25 *fps* with 625 lines at a frame. That is the reason why videotape from the United Kingdom, where PAL standard is used, may not be viewed here in the United States with a typical VCR/monitor that uses NTSC standard, unless a multi-system VCR or converter is used.

Editing traditional video is a knowledge demanding, time consuming, and high-cost job. Professionally trained technicians are normally needed to do the job. Due to the linear feature of analog video, dubbing and editing require several people and consume large amount of time. In addition, heavy and expensive equipment is needed to accomplish the task (Yao, Ouyang, & Wang, 2000).

Digital video on the other hand is quite different from analog video. It is more advantageous than analog video (Lozano, 1997, Slaughter, 1998, Vaughan, 1994, Villamil-Casanova & Molina, 1997). Digital video is recorded in digital format if it is shot with a digital camcorder. In this sense, the video footage is universal, e.g., both Macintosh and PC computers can view and capture it. Unlike analog video, digital video equipment with DV terminal or connections lets you edit, copy and transfer data digitally, with virtually no generation loss in image and sound quality. The DV terminal is for both line-in and line-out, since a single DV cable can handle data in both directions. Dubbing with this terminal is much simpler than that in analog video. No heavy and expensive equipment is needed.

The superlative advantage of digital video is its non-linear editing feature. Analog video is recorded on videotape in a linear fashion, which means that there is the time span from the starting point of the video to the end point of the video. Assume that the video is an hour long and we want to view what is on the tape at the point of thirty minutes, the videotape has to be forwarded to the point of thirty minutes in order to view it. If the viewpoint wanted on the tape is five minutes back at the beginning of the tape and at present the video is an hour down into the tape, then the tape has to be rewound fifty-five minutes back to view that point. Let alone the difficulties and time involved to pin point the exact place on the tape, even though some of today's video editing systems are equipped with digital counters. Adding sound to video can be as difficult and time consuming as the video part of editing. However, digital non-linear video editing has forever changed the rule of the video world (Lozano, 1997). What is non-linear editing? After the video is digitized and transferred to a computer, it is stored on the computer's hard drive. When editing the video, the editor can find and access any point of the video without winding or rewinding the footage as analog video editing does. Much like word processing on a computer, one can find a time place or frame by simply clicking and/or dragging on the monitor control panel or the timeline to move to the point or frame where you want to be. The newly constructed video can be saved as a new file without destructing the original footage. In digital non-linear editing, trimming, cutting, pasting, adding, inserting, overwriting can never be easier compared with analog video editing. The same is true with sound to video. Almost unlimited video and sound tracks can be used to edit or mix video and sound. All these can be done on a single computer. That is what so-called non-linear editing.

Another advantage of digital video is that video can be compressed, which means that video file size, frames size, and quality can be manipulated. Since digital video file size tends to be very large and takes large amount of computer hard drive space, by reducing its size, one can store more video on the hard drive or on other storage devices. Nevertheless, the quality of the video will be reduced as the file is compressed. The more compression a video file has, the less quality it has. To solve the problem, smaller video frame size and/or lower frame rate are normally the choices.

As World Wide Web is gaining the momentum, digital video is also moved onto the Web. A problem with digital video on the Web is that it takes a long time to download the video file to the computer before it can be viewed if the file size is large. Thus streaming video technology was invented. What is streaming video? Streaming video refers to digital video files can be viewed as they are being downloaded from the Web. "Since viewers watch streaming video on the fly, they don't have to wait for long downloads" (Davis, 2000a). On the other hand, by compressing video, digital video can be streamed and put onto the Web faster and easier.

Current Digital Video Technology

Traditional digital video technology relies greatly on the conversion from analog video to digital video. A video footage is short using an analog video camera and recorded on videotape. A computer with a

video capture board is needed to convert the analog video into digital video and store the captured video on computer hard drive. Of course, one can also capture video footage by connecting video camera directly to a computer that has a video capture board. That is obviously not practical for the cameraman since the computer has to go with the camera all the time. The quality of the digital video capture board determines much of the quality of the digital video footage captured. The CODEC software that comes with the video capture board is the other part that determines the quality of video captured. A digital video capture board can range from a few hundred dollars to several thousand dollars.

Like the advancement of other technologies, digital video technology has also made a leap jump in these few years. The most innovative is the digital video camera. The outlook of a digital video camera is no much different from an analog video camera. But digital video camera captures video in digital format and stores the video on digital videotape. In 1997, Sony Company introduced 3CCD technology, which uses 3 computer chips to calculate the three major colors, elevating digital video camera to a new high-quality level. A good digital video camera is normally equipped with steady shot image stabilizer, which eliminates shaky shots caused by unsteady camera move when long digital zoom is used. Digital video camera also captures sound in digital format. This feature enhances greatly the sound quality in digital video and makes video editing much easier. Some good quality digital video cameras use PCM technology, the same as used in CDs for a breathtaking dynamic range of 96 dB. Since video and audio signals are all recorded digitally, the captured video footage can be copied or edited multiple generations with no loss in quality. Many name brand digital video cameras provides 16:9 aspect ratio recording options, which means widescreen video can be recorded for widescreen movie and future compatibility with HDTV. Another very important feature of most digital video cameras today is that these cameras have built-in high-speed FireWire (IEEE 1394) interface. This interface allows for 2-way direct digital communication between either a digital video camera and a compatible computer or two digital video cameras. When connected to a compatible computer, the interface lets you perform economical, broadcast-quality, non-linear editing easily. When connected to another digital video camera, it lets you to produce duplicate copies of recordings without any loss in picture quality. Each copy is a perfect clone of the original. These advantages definitely overwhelm analog video.

Great improvement for digital video has also been witnessed in computer technology development. Computer is the essential tool in digital video editing. It is the advancement of computer power and capability that promotes the proliferation of digital video. A couple of years after Intel's Pentium chips came into the market, a computer chip technology called MMX was introduced. This technology greatly improved the computer's power to process multimedia, including digital video and sound. Later, MMX technology was integrated into Intel's Pentium II and the chips there after.

Data bus speed was increased from 66Mhz to 100Mhz in most of today's computers. Some have gone up to 133Mhz. 3D video accelerator becomes common for display with 8Mb or 16Mb of memory, or even higher. The most noticeable jump to the public is the computer's clock speed. Within about two years, it jumped from 200Mhz to 1Ghz and over, giving computer a much higher speed to process video. However, the most creative advancement from the point of digital video is the establishment of IEEE 1394 interface (also jargoned as FireWire and iLink) as the standard for digital video communication between digital video camera and the computer. FireWire interface allows transfer rate up to 400Mbps compared to 12Mbps of USB, which is another newly standardized interface for computer peripherals. Such companies as Sony, Compaq, and Dell have integrated this interface with their high-end computers. This advancement has truly made digital video editing available for end users and reduced video rendering time during editing.

Video editing software is getting better and easy-to-use, too. Some, such as MGI Software and Ulead, offer the basics of video editing capabilities. This type of software is called Beginners Editing Software, normally at a low cost. Others, like Trinity and Avid, offer much more editing capabilities, such as more powerful titler, more transitions, more video and sound tracks, more powerful sound editing and mixing capabilities, more after effects, more encoders, and the like. This kind of software usually requires high powerful computers and is adopted mostly by video editing professionals. In short, software availability, especially for beginners, provides a better opportunity for more people to be able to create and use digital video.

Smart Selection

"What hardware do I need?" "What software do I need?" These might be the foremost questions from teachers who want to start with digital video. The selection of hardware and software does play an important role for the beginners. Advanced digital video and editing systems not only cost more, but also tend to have

higher learning curve. It would be smart for the beginners to start with a low-end system, including both hardware and software. This can reduce the cost on one hand and make it easier to get started on the other. To select a digital video system, teachers may find the following suggestions useful:

1). Digital video camera or you may call it digital video camcorder. Selecting a digital video camcorder to start with makes it much simpler than starting with capturing video through video capture board. As mentioned above, using a digital video camcorder eliminates the digitizing process. Then how to select digital video camcorder? One concept has to be cleared off first. Some digital camera can also record digital video. However, the digital video that a digital camera records is not the same as what a digital video camera does. What digital camera records is compressed video, usually in MPEG format. Whereas, what a digital video camcorder captures is full-motion uncompressed video. This is the kind of video that needs to be edited by using a digital video editing system. The cost for a digital video camcorder varies greatly as mentioned earlier. For the beginners, the choice is evident – low-end one. A few tips need to be kept in mind when selecting the digital video camcorder: *Video resolution*. Video resolution is measured in the number of horizontal lines. Higher number of horizontal lines contributes to higher video resolution. However, higher number of horizontal lines usually cost more. A number around 300 would be a fairly good low-end digital camcorder. *FireWire DV interface*. Look for this interface while selecting a digital camcorder today. It is a two-way input/output that carries digital audio, video, and control signals from the digital video camcorder to the computer or other compatible devices. A digital video camcorder without this interface may not be an updated product and probably not a good choice. *Image stabilizer*. An optical image stabilizer is better than a digital electronic image stabilizer. If two digital camcorders are at the same price, plus the same other features, choose the one that has an optical image stabilizer rather than the one with electronic image stabilizer. *Photo mode*. Photo mode equals to a digital camera in the digital video camcorder. It makes shooting images much convenient, e.g., without changing cameras. However, a digital video camcorder's photo mode cannot achieve the high image resolution quality of high-end digital cameras so far. *Analog line-in*. This input on a digital video camcorder will become very useful for those who will deal with analog video at the same time. *Built-in speaker*. This is a very important feature on a digital video camcorder. It allows you to listen to the sound of the video when playback video on the camcorder. Without it, the camcorder is certainly missing something and should not be a choice. *Color LCD viewfinder*. A beginner will find the color viewfinder on the digital video camcorder very helpful. There are many other features on a digital video camcorder that need to be pay attention to, but they are beyond the scope of this paper. Companies like Sony, Canon, Panasonic, JVC all have low-end digital video camcorders with prices within $1,500, such as Sony's DCR-TRV series, Canon's ZR-10, Elura 2, Optura, Ultura, Panasonic's PV-DV series. For teachers with some experience in digital video and want to move up to a higher quality level, Canon's GL1 and XL1, Sony's DCR-VX1000 and DCR-VX2000, Panasonic's AG-EZ30, etc. will be a better choice.

2). Computer hardware. The suggestion for teachers to select computer hardware is always go with the latest technology. This is because digital video requires higher computing power, which includes clock speed, bus speed, memory, and hard drive, than normal applications. The higher the computer power, the faster your capturing and editing work. On the low-end, minimum system requirement is: Processor, Pentium II, 300Mhz; system memory, 128Mb; hard drive size, 10Gb (SCSI drive recommended); external bus speed, 100Mhz; sound system, 16-bit sound card; interface, FireWire (IEEE 1394). If the computer does not have FireWire interface, FireWire interface card can be purchased and installed easily. However, most digital video editing system kit today comes with a video capture board that has integrated FireWire interface. Note that the system kit that comes with USB interface for video should not be your choice since it is much slower than FireWire interface.

3). Digital video editing system. Generally the following is the easy editing solutions for digital video editing: editing appliances, turnkey computer editors, and external capture devices (Davis, 2000b). Editing appliances, such as *Panasonic Digital Media Editor* and *Draco Avio ST*, are specially designed computer for video editing only. They cannot do anything else as a computer does. For teachers, though almost no hardware configuration and low in price, an editing appliance is still an extra cost if they already posses multimedia computers. Therefore, these appliances are not recommended. Turnkey computer editors refer to digital video editing kits. A turnkey computer editor, like *DVGear DV Warrior*, is actually a full-function video editing computer with everything you need, except digital video camcorder. If budget is not a problem, this is a good choice for teachers, especially for teachers who teach digital video. However, the price for turnkey computer editors varies greatly between easy ones and professionals. They may range from a couple of thousand dollars, such as *DVGear*, to over $40,000, like *Avid*, depending on the system configuration. Low price models in *DVGear*, *DVLine*, or *Sony* are recommended. External capture devices are devices that help capture video. They are inexpensive, but most of them are not for full-motion capturing, e.g., at 30 *fp*. Of course they are not

recommended. There is another way to get digital video editing system and it is probably the most practical and economical for schoolteachers: Create-by-yourself. It is relatively less expensive if you already have a Pentium or higher speed computer. Create-by-yourself refers to buying a video capture board, choosing video-editing software, and installing them into your computer all by yourself. Sounds difficult? Not at all in practice. Just get a video capture board of your choice. Video capture boards can be purchased between $200 and $4,000 depending on names and brands, such as *Pinnacle Miro 30* at about $200 and *Truevision Targa 2000* around *$3000*. These boards normally come with intermediate level video editing software, such as *Adobe Premiere*. You may choose beginner level video editing software if you like, such as *MCI Software VideoWave III* and *Ulead VideoStudio 4.0* at about $100. At the price of about $800, *Pinnacle DV500* gives you almost all you need for video editing. The package includes a video capture board with FireWire interface, video editing software *Adobe Premiere 5.x*, software for making CD and DVD, and the appropriate interfaces for analog A/V inputs/outputs. Installation and configuration are fairly easy. To go by create-by-yourself, make sure that the video capture board you purchase has the interface to match your digital video camcorder; the board you purchase must be compatible with your computer's hardware (motherboard most of the time) and operating system. We recommend you try this method. Notice that Macintosh computers are not mentioned here simply because of the dominant PC majority user population.

Video Creation

For convenience, *Canon GL1* digital video camcorder, *Sony PCG-F490* laptop computer, and *Adobe Premiere 5.1 LE* non-linear editing software are selected to illustrate the necessary steps of how to capture video from digital video camcorder and edit it on a computer. Although other systems may be operated differently, the concepts will be universal and consistent.

Getting Started

First, shoot a piece of video using the digital video camcorder (To save space, how to shoot video with the digital video camcorder will not be illustrated here.) and make sure that the DV tape with the video is in the camcorder. Connect *GL1* to *Sony* computer via the FireWire interface on both the camcorder and the computer with a 4-4 pin FireWire cable. Turn the power switch of *GL1* to VCR and rewind the tape to the beginning. Turn on the computer. Go to Start. Under Programs, find and launch DVgate Motion under DVgate. After DVgate Motion program is launched, in MODE box on the program control panel, make sure that IMPORT - Auto is selected. REC DATE should show the current date and time. Other display boxes shall show zeros. On the left side of the program is the Monitor window. On the right is the IN/OUT List, where on display is the number of clips captured, capture in and out points, duration and file size of the video captured. On the GL1's display window, DVin should appear, indicating that the communication between the camcorder and computer is ready.

Capturing

The videotape playback on the camcorder can be controlled both on the camcorder and the DVgate program control panel on the computer. Using the control panel on the computer is recommended. Start the video playback by clicking the play button on the program's control panel. At this time, the Monitor window will display the video on the tape in the camcorder and the TIME CODE, IN, and DURATION boxes will display the relevant number. FAST, SLOW, and STEP FORWARD and FAST, SLOW, and STEP BACKWARD buttons can be used to find the exact point where the starting capture point is on the digital videotape in the camcorder. While observing the time codes and the images being played back on the video display area, click the MARK button when the target-starting image appears. This establishes the IN point and an image of this point is shown in the IN/OUT list. The time code display area shows the time code of the IN point and the elapsed time of the video playback from the IN point. Click the MARK button again when the target-ending image appears. This establishes the OUT point. The marked points can also be cancelled at anytime by using the CANCEL button on the control panel. When the marked in and out points are confirmed, click the CAPTURE button to capture the marked points one after another or click CAPTURE ALL to capture

all the marked points. On the IN/OUT list, the in and out points, duration, and file size of the captured video will be displayed respectively. The captured videos are simultaneously stored in a pre-assigned folder in AVI files. The captured video can also be saved in a different directory. At this moment, video capturing is completed. It is ready to be pulled into an editor for editing.

Video Editing

Find and launch *Adobe Premiere 5.1 LE* non-linear digital video editor. Select project settings (This is typical in *Adobe Premiere*.). *Premiere* displays automatically the monitors, one for the Source video, the other the Target video; Project window; Timeline window (also called Construction window); and some other windows depending on user customization. The program is now ready to accept video. Use Import under File to find the folder where the video files are stored and import the video into the editing program. The imported videos are listed in the Project window. Click and drag a video into Source monitor window. Use the Frame Jogger to move forward or backward. Use the Mark In and Mark Out buttons to mark the video clip. After the marking, click and drag the marked video in the Source window onto the video 1A track on the Timeline. Sound of the video is also dragged to the sound track automatically. If sound is not wanted, deselect the sound icon button on the Source window. Then sound will not be brought onto the sound track but only the video. Once on the Timeline, all the editing features can be added, such as adding transaction, adding another track of video, superimposing, adding title, moving clips around, making the clip longer or shorter by just dragging it on the Timeline to the direction to be longer or shorter. Of course it cannot be dragged longer than its original. Almost unlimited video and audio tracks can be added in Premiere (up to 99 tracks). After the effect and process editing, the edited video must be saved in a directory before Premiere can view the edited video. After it is save, you can preview the edited video and edit it again at anywhere and anytime. When you want to view it again, Premiere renders the video and gets it ready for you to view. The saved edited view now becomes a Premiere project file. It now can be exported according to the editors desire and software encoders in other file formats, such as QuickTime movie, AVI file, Microsoft Video, etc. This is how video is edited.

Conclusion

Digital video technology is advancing fast along with the computing technology. The cost for digital video editing systems will be getting affordable. As the requirement for teachers to use digital video increases, digital video will become commonplace for teachers to integrate this technology into curriculum. With the right tools and knowledge in digital video, teachers will be able to meet the challenge of creating digital video for effective teaching and learning in the twenty-first century.

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A farewell to the traditional instructional media and technologies in the new millenium.

CHANGING INTERPERSONAL RELATIONSHIP BETWEEN TEACHERS AND STUDENTS USING TUTION

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Abstract

In this work we are proposed relocation of teacher's time during process of education. We have analyzed mutual student teacher relationship and proposed relocation of teacher's time as well as combination between tuition and classical teaching. The most common problem in relationship is insufficient experience or knowledge of teachers but as well learners (changing of learning paradigm form secondary school to higher education, or change in level from graduate studies till postgraduate studies). We have proposed different practical approaches and techniques for solving problems in teacher – learner relationship. Results have been obtained in both introspective form and testing form - student's evaluation of courses and marks.

1. Introduction

Mutual student - teacher relationship is key factor in learning process. Students' motivation is significant from that source. Many objective problems during learning process have been solved thanks to good relationship between teacher and students. Also some of the biggest problem during learning have been caused by bed relationship between students and teachers. And proposed relocation of teacher's time as well as combination between tuition and classical teaching. We are proposed different practical approaches and techniques for solving problems in teacher – learner relationship. The most important aspect is reaffirmation of tuition as the form of learning almost forgotten in higher education (mostly from the objective reasons). Results have been obtained in both introspective form and testing form - student's evaluation of courses and marks. Here proposed example is best for the first year – starting subject, because as it is stated later could solved additional problems caused by changing of learning paradigm. Of course it is applied on every type of learning.

2. Problems

It is not aim to accuse nor students or teachers but in real life every of us have been witness of mistakes on both sides. If we are excluded problems generated with purpose, we could roughly located motivation as a factor mostly dependent and vulnerable. From students perspective the most common problem in relationship is insufficient experience or knowledge of teachers. Both of those "unperfection" produced loosing of authority and credibility. From learners view the biggest problem is came from changing of learning paradigm form secondary school to higher education, or change in level from graduate studies till postgraduate studies. Several other problems have been monitored. Process of learning have became more pressured for teachers as asks from community raised. Another process is transformation of power channels and strength from teacher to students. Students have today much more rights what is one way positive process, but in other hands they have to take as well responsibilities, which by the line of low resistance they don't wish to accept. Also have been starting process of some kind of pressures from students toward teachers. Result should be satisfactory mark taken actually by the "force". Teachers have made negative reactions to whole group of students regarding that kind of respond. All together it leads to process (by the low of negative feedback) which results are negative for both sides. Resulting problems are: Students haven't confidence in teachers. Students think that teachers don't care for them. Students don't understand difference between secondary and higher education. The way for solution of this problem could be building new way of relationships, which has more confidence. But confidence we couldn't build by the low. Confidence is "wage" received in process. Teacher who couldn't deserve it with knowledge and skill need to put other assets to have it. Time is one of the resources available to everyone.

3. Proposal

Students needs from the start additional time, because they felt as loosed. In some educational system secondary school is pretty "liberal" and "learner oriented" so students work mostly with teachers help. When they come to university they are faced with completely different atmosphere, mostly without any personal contact with teachers. This proposal could solve some big problems. We are proposed teaching one or two subjects in the first term – semester in different way using combination of tuition and lecturing. It is obviously that teacher time for those subjects have to be almost duplicated because big portion of time should go on building new relationship between teacher and students.
As well proposed system should help in resolving problems caused by new environment and new conditions of living. This is another reason for positioning subject taught on tuition based in the first year of studding. This process is off course not easy, but if efforts come from both side results could be surprising. Ideas in this work have been tested in last four years, and are still in testing. Model which we suggest are modified from basic model, and what is from most interest one of the result is that different culture (but not very different) accepted teaching on completely different way. There for some of methods which were successful in some environment result as completely different in different environment. The big problem is also that different kind of students in way of personal predisposition (for example technical, media and art students) responds to teaching on completely different way. Students need starting week where they get information about process of learning, using literature Internet, distance base education and other types of education and communications whom they haven't been introduced before. Every university have this introduction but mostly on the wrong way, without results. Students are needed closer communication with teachers. In that sense logical solution is reestablishing institution of tutor. Also every subject should have at least some short interval of tuition [Vladan Zdravkovic. Reaffirmation of tuition in learning, Being Virtual, spring 2000]. It is clear that it is very complicated, especially for basic subject, where the number of student could be 500 per teacher, but it should be solved throe assistants or some other form of consultants. Teaching process should be more personalize. It's means that teaching process should more fit to students needs, abilities and wishes.

4. Solution

The main problem is relocation of teacher's time. As reintegration of tuition needs more teachers' time, where from time is came? Some topics actually haven't needed for human "on line" taught. These topic should be delivered by some form of education on demand: Web, Video, audiotape or as an assignment to read. Time have released by these approach could go to tuition. That concept has been introduced in 1998. First modification has been applied during winter semester 1999/2000, and second modification has been applied during the spring semester 2000. Third modification is still in progress and results will be presented on conference. Here we are presented solution for time saving. Students have been split in several groups (from 2 till 5) regarding their previous knowledge, and abilities to attending the technical level of lessons. On that way teacher were able to offer two kind of lecturing for two kind of students. The time for providing these idea coming from labs lessons where students receives freedom to work on their own (as well taking responsibilities for their own time and work). Also time have came from timing scheduled for theoretical lessons (because theoretical lessons have been performed on video base, giving chapters from book to reading (where they completely match subject) so teacher gave answers on questions during tuition).

5. Results

From the start results have been very unsatisfactory, but analyzing them conclusion were that several mistakes had been performed on start, which have been omitted later process. Understanding those mistakes, we have performed modification. After modification method have performed quite well and responds of students were over expectations. In full version of work is table with students' mark for subject and teacher.

6. Conclusion

Tuition has reestablished confidence and significant improved students' confidence toward teacher. It has helped in learning and solved many problems mostly couldn't be solved without using of tuition.

Solving educational problems during learning computer visualization applications and raising students' creativity

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Abstract

Learning visual based application has been one of the biggest problems for most of students. Both in art and technical education. One of the reasons is that education in computer visualization, especially in area of 3D modeling, 3D animation, computer-generated special effects and programming for multimedia and VR applications are not same as education for standard computer application. But any way teachers have been trying to implement standard educational techniques. The solution is in changing learning paradigm and tries in more flexible and differential approach. In this work we are presented combination of project based learning and teaching have been implemented in different proportion and sequence.

1. Introduction

Education in computer visualization, especially in area of 3D modeling, 3D animation, computer-generated special effects and programming for VR applications are not same as an education for standard computer application. Experience has been showed us that we should implement different strategies, methods, motivation approach and even change complete paradigm. Usually way of teaching should be abandoned, and project based approach with flexible, dependent on class dynamics and structure, teaching process should be implement in all steps of learning. In our case teaching has been combined with projected based approach where teacher showed on different types of applications mistakes and good solutions. This approach not even has been raised students knowledge and speed in acquiring knowledge but raised students' creativity [1].

2. Problems

Because of all differences between learning of visual application comparing with other computer related subjects educators should be careful and specially take care about following aspects:
Difference in way of adoption lecturing in those fields.
Importance of order of teaching and going step by step by subjects.
Group dynamic and structure have been more important comparing with "not visual related" subjects [2], [3].
Interdisciplinary and multidisciplinary of subjects especially connection with artistic problems and specialty, which this connection should bring in process of education for computer visualization. Also, learning animation programs carry problems. It is difficult and time consuming. Students could be unsuccessful and their self confidence will fooling down. Immersed in animation world, students could "forget" about primary task – learning other visual based subjects.

3. Methodology

In those research and presented work we have used some of not popular methodology, as dividing students, making range between them as more or less gifted for subject, but reality and experience show us that visual based applications are not kind of software which is immanent to every person. Beside that we have made this grouping on the way that student didn't realize that they are in different groups. If some of them had realized that, they didn't complain.
We have tried to implement different way of learning offering to students' different speed and type of learning. During our research terms have been changed, not all groups had have same tests, and not all results are processed. So the experiment should be treated as is still in progress and development and results as preliminary not as final. Any way now we are in phase that results could be useful so we are published work.

4. Project

We have made project in 3 phase. First two phases are finished. There is final last phase that should be finished and than results will be completely valid.
In the first phase we have tried to discover different ways of learning and approach to understanding visual based computer applications. We had tested students, before they have started education. It has given us base for almost absolute compression between control groups and different styles of teaching. Based on that we have monitored their success in learning visual based applications more efficient. Enrolment test had two parts. A psychology test based (mixture of intelligence, motivation and socialization aspects) and "subjective" test of creativity where students bring their "artistic" work, what have been upon their choice. Most have brought drawings, some stories or songs. We have correlated results on these tests and their educational background and their marks during education. During the first phase of research we have changed application for learning because we had found that some visual based applications allow faster learning results and stronger base for efficient learning then other correlated applications.
In the second phase we have gone deeply in problems of different way of teaching and learning. During that process we have tried different strategies in approaching to students and with different styles in learning. As in the previously phase we have used method of variation of teaching style of teachers. That method has been applied always on main teacher (teaching theoretical lessons). But instructors (lab assistants) approach for application programming has been a little bit different. Sometimes when we had been sure that instructor was able for transformation teaching style, we have used same person. But when we had thought that instructor wasn't able to change teaching style we have changed person, so we worked mostly with different types of instructors for learning application programs.
We have generally classified three types of approach to students. Criteria are mixed and complicated for explanation. We have also developed three different ways in presentation of theoretical topics. One way has been presented theoretical topics before practical, especially before learning application programming. Another has first used method of learning application programming without any theoretical introduction and then after finishing that learning working with theoretical lessons. Finally last method have been combination of that two in the way of positioning practical learning in the middle of learning process. The method where theoretical lessons had came at the end (after learning application program) has been rejected. We have tried with this approach several times, but with evidently refusing from the students. We also have appended learning of animation and modeling even to those who learned just multimedia programming, because we had believed that by this way students could improve their learning and understanding abilities [1].
Also there is a place to notify that we couldn't treat the results of experiment as absolute because for the main subject interactive multimedia – application program Macromedia Director, we have used results application – CD-ROM as criteria about successful fulfills of program. Some criteria in marking those kind of application could be absolute as number of mistakes in programming or consecutive of design or level of interactivity, but some are relative as quality of design [4].

5. Subject

The chosen subjects have been Computer Animation, Digital Postproduction and Interactive Multimedia. Although name Interactive Multimedia suggests learning multimedia based programming, it covers as well computer animation and modeling. Sometimes originally subject Interactive Multimedia already had included learning animation, modeling and editing (but on a very basic level), sometimes we ad these two areas in syllabus. Digital Postproduction have had also animation and modeling in syllabus. The reason is that we believed that learning modeling and animation could help in learning related topics in multimedia and that it raises student's creativity.
In process of learning as application programming learning we have used Adobe PhotoShop, Macromedia Director, NewTek LightWave, 3D MAX, formerly Kinetix now Discreet and Adobe Premier. We have used two countries and two educational systems for monitoring results. We have used Sweden and Yugoslavia. Also we have used groups of University students and students taught for company training. Total number of students have been more then sufficient for reliability of results (more then 400) but not all of them had been tested on same conditions, so we could compare smaller groups and building different correlation between different groups. The biggest problem have been impossibility for psychological and creative enrolment (pre-test) for all learners. Another problem has been caused by changing learning application.

6. Mission

In theoretical teaching most emphasis had been given to following topics: Interactivity, Multimedia, Production and basics rules about film making and visual aesthetics.
Main tasks what we had assigned to ourselves have been raising student's creativity, understanding problems in production of multimedia, animation and special effects, understanding purpose and ways for realization of interactivity. Finally all that have been implemented to making students able for developing interactive multimedia application by themselves.
Monitoring of success of that process has not been so easy. How to monitor for example creativity of students? Even if such progress could be monitored, what will be defined as creativity? What is creativity for one person could be pattern and monotony for another. So it has been obviously that these task would be unmeasurable. One of ideas had been measuring this progress by introspection of students. We have abandoned it as completely not valuable method, but we had asked some of the students (selectable those for whom we suppose that could give honest and reliable answer), and those results we have assorted among "not valuable" results.
Students have made two kinds of assignment. One has been modeling assignment obligatory for all groups. First in NewTek LightWave (just in Yugoslavia), then 3D MAX (both Sweden and Yugoslavia). Another assignment has been deepened on group. For Interactive Multimedia it have been programming assignment in Macromedia Director. Programming assignment first have been made by one student, but later we change it on system two students one project, even it were cases where were 3 or 4 students on assignment (where the project was bigger). In Animation it have been advanced modeling or animation assignment depending of student's group. In postproduction it have been editing, digital composing and digital effect.
When we are compared results of students work we also compare other marks in their studding (where is possible) and that we also made using two criteria. In the first phase we also marked work in editing made in Adobe Premier, but we have realized that these mark had been mostly based on subject evaluation and on personal preferences. We had decided to abandon this program from those who were relevant for research. Any way students have received lecture in that program and worked in it, but it was out of evaluation for this research.
Regarding the modeling tasks we have tried with following system. Students' different ability had received different tasks of different difficulties. It have shown very good results, because by this way very good students produced excellent models and not so gifted students, succeed in producing sometimes pretty good models. It have been much better results from the previous attempts when we have made same way of assignment for all, and where the result were that in case when assignment were to difficult, not so small number of students just quitted from the work. In reverse case when we have given to easy assignment there were not extraordinary works.

7. Methodology for marking

One of the fundamentals have been building stable marking system, which could eliminate as much as it is possible subjective impressions. System of marking have been stable throe hole research, and we build marks from following parts:
Global impression of model has received maximum 10 points.
Model position on surrounding ground has received maximum2 points.
Economy of model (it means number of polygons used for building the model) received maximum2 points
Lighting of model and established atmosphere of the scene have received maximum 5 points
Number of points in modeling assignments has been doubled if it was group for animation and triplicate for group for modeling. Points for multimedia presentations are followed:
Overall impression have brought maximum 30 points
Design have brought maximum 20 points
Navigation have brought maximum 10 points
Style have brought maximum 10 points
Incorporation of sound have brought maximum 7 points
Concept have brought maximum 5 points
Implementation of Idea have brought maximum 15 points
Implementation of topic have brought maximum 5 points
Story have brought maximum 10 points
Interactivity have brought maximum 10 points
Technical aspects (speed, mistakes…) have brought maximum 10 points
(Number of points has been 132 points, higher of 100 because it has been combined with modeling.
After finishing assignment all students have received replay on assignment and change their model, animation or application. That we have used because idea is that if students missed some essential aspects it is problem of teacher who hadn't transferred knowledge on correct way, from any reason. It could be student's absence from class or teacher mistake in education. But if the problem hasn't been fixed even after warning, these have been treated as student's mistake.

8. Results

Because we have got many correlation complete table of results is impossible for showing in work. Here we are presented table with comparison of three groups on the same University, and same subject - Interactive Multimedia. Groups have been worked in half-year delay and group one has worked with classical approach to Multimedia without active implementation of Modeling and completely without learning of animation. For group one teaching in modeling have been actually just learning about interface.

Average Marks:	Mark for program	Design	Overall Impression	Navigation
Group \max. points	132	20	30	10
Group 9	28	5	6	3
Group 13	64	12	18	4
Group 14	72	14	24	4

Table 1

Mission from the learning have been conducted in late two groups almost completely (criteria have been nominate as for the professional production. Significant difference in results has proved correctness of method.
Another interesting results have been notified in comparison groups who have worked with complete practical – project based approach (group 9), mixture of project based approach when the process has grouped in two blocs. First theoretical then practical (group 13), Mixture of theoretical and project in order theory – project 1 – theory – project 2 – theory – final project (group 14). This result is not so absolute valid as previously one because group 9 is from different country, and also global abilities of students and their pre knowledge before stating of course was different. Also it have been corporate training in difference from group 13 and 14 where it have been University education. Also training of group 9 have been much longer then training of groups 13 and 14 so we have provided two overall marks after first block of

work (about same amount of work as for the group 13 and 14 and final work (doubled time). Another different is early differentiation in-group 9 so learners have been divided in-groups as programmer designer and sound editor, what produced problem in their overall work.

Average Marks:	Mark for program	Design	Overall Impression	Navigation
Group max. points	132	20	30	10
Group 9 first result	38	8	7	4
Group 9 final result	46	10	10	5
Group 13	64	12	18	4
Group 14	72	14	24	4

Table 2

9. Conclusion

Marks (objective criteria) and even more subjective criteria as a teacher filing about assignment shows all advantages of implemented approach in teaching. These project any way needs more time for testing, implementation of used techniques in teaching and comparison with others teacher's results (what is in progress). Any way there is no doubt that some of approaches should be implemented no meter of kind of educational organization or personal teachers approach, as is project based learning, different approach to different students, "quantityzation" of assignment and "personalization" aspect during teaching. Although project based learning is evidently more improved method of teaching [5], [6], it has to be implemented with careful and mixed with other methods.

10. Literature

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Designing Constructivist Teaching and Learning Environments For Visual Learning

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Abstract: This paper discusses the design of a graduate course in visual learning based on constructivist teaching principles. The conceptual framework is described, and guidelines and examples of each project are presented. Innovative strategies that contribute to a constructivist teaching and learning environment are discussed. Student and instructor comments are also shared.

The Importance of Visual Communication

Most living things depend on some form of visual communication every day. As human beings, our lives are intertwined with a rich array of visual information that is presented almost every waking moment. Beginning when we get up in the morning and often continuing into our dreams at night, we are continually being affected and influenced by the colors, images, and the media that bombards us. The world is becoming more and more visually oriented as the shear amount of information increases at an alarming rate, and we struggle to make sense it. We depend on visuals to help us understand concepts and procedures. Visuals can be very useful in solving problems. From Dr. Snow's maps plotting the location of cholera deaths in a central London neighborhood in 1853 to illustrations showing us how to connect cables to our computer, visuals often show us how to solve complex problems with very little support from text. Visuals are also tools of persuasion; printed and television advertisements influence people in making decisions. Spoken words such as poems or metaphors often create visual images in our minds. In spite of the overwhelming use and influence of visual information in all parts of our lives, educators are often not as knowledgeable about creating effective instructional visuals as text-based materials. More often they use verbal forms of communication to teach rather than visual presentation skills. Literacy skills for both teachers and students should include visual as well as verbal literacy. Visual literacy is "the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images." (Braden, 1996)

Constructivist Teaching Environments

Designing effective teaching and learning environments is a complex and challenging task for educators. The course environment should facilitate students' ability to manipulate the content of the course to fit their specific learning needs and goals. Students should interact with the course information in order to develop proficiencies in both the theoretical framework that guides our understanding of how visuals can be used instructionally and specific technology skills in graphics software. A project-oriented approach seems to meet these goals since the guidelines for each project allow students to create products that are relevant to who they are as learners and reflect on the competencies they need to master.

Course Description

The Visual Representation of Information covers a wide variety of topics related to the effective use of representing information visually in instructional media and materials. The primary purpose of this course is to enhance students' ability to conceptualize, design and develop visually rich and appropriate

materials that support and enhance active teaching and learning. Although the primary focus of this course is the effective use of graphics in interactive, computer-based instruction, the concepts can be applied to the design and development of materials for other courses, presentations, and instruction.

This course blends theoretical and research issues related to the use of graphics in instruction with production competencies. Students explore and evaluate the design and creation of visual information in a variety of technology-based learning environments. Another purpose of this course is to enable students to get in-depth, hands-on experience with a variety of graphic software programs. The general format of this course is a mixture of demonstration, discussion, and hands-on experiences, and the role of the instructor in this course is one of a facilitator rather that a source of all knowledge. In most technology-related courses, it is impossible to know everything; there is simply too much to know, and it is continuously changing.

Objectives for This Course

During this course, students participate in readings, discussions, and hands-on explorations of the following topics: creating appropriate visuals for instructional content and the intent of the instruction, understanding the role of visuals in facilitating learning and the relationship between learning theory and visual perception, knowledge of the research on visuals in instruction and the resulting instructional design principles; familiarity with the concepts of visual design and communication in computer-based instruction, and skills in creating paper and electronic documents such as storyboards, design documents, and flow charts that convey accurate descriptions of visuals to production units such as illustrators, artists, videographers, and photographers.

Through skills development and five projects, students develop a personal understanding of design principles for computer-developed media, become able to apply design principles to situations involving the creation and evaluation of both static and animated graphics using technology, and develop a meaningful visual vocabulary that extends to other environments outside of this classroom. In addition, students learn to use creative brainstorming to develop instructional graphics to solve problems and communicate effectively. Finally, through authentic, challenging activities, students develop skills in Adobe Photoshop and ImageReady techniques.

Learner Profile

Typically students in this course are enrolled in the graduate instructional technology program, but few have experience in art or graphic design. At the beginning of the course, most students are interested primarily in the skills development, even calling the course, "the Photoshop course," but by the end of the semester, they realize that the development of visual literacy skills and the accompanying theoretical framework for design is more valuable.

One student stated it this way:

> *...the projects made me seek to absorb as much Photoshop as I could for each project. I want to have a good grade in the course, but I will be better served by the knowledge I have acquired from the course. I wanted to learn Photoshop two grades above "A". There was so much other needed knowledge gained in colors, metaphors and interface design, that the whole class was enriching for my use and career-to-come.*

Students have many responsibilities since the satisfaction and enjoyment of this course depends, for a large part, on the time and effort that each student dedicates to exploring the issues, learning different techniques, and playing with the tools. There is a great deal of time involved in learning graphic application software, and most of that learning occurs outside the regularly scheduled class. Students often spend as many as 9-12 hours each week working on the concepts and techniques discussed in class.

Course Projects

Project 1: Learning the Language of Art

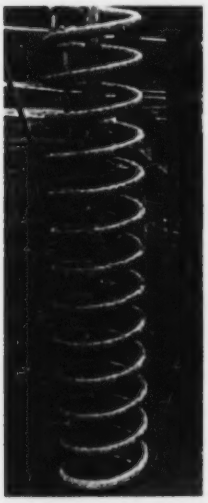

Figure 1: Illustration for the Concept of Line

In order to develop a common language for communicating about visuals and design, students research either an element of art or a principle of design and combine original graphics and descriptive text to create a reference for the Language of Art Resource in the course materials. Students demonstrate competencies in general graphic skills by scanning photographs, choosing correct file formats, appropriate selection areas, and appropriate size. Students also demonstrate general design skills by selecting appropriate type style and size, chunking text to improve readability, and creating appropriate balance between text, graphics and white space. Finally mastery of basic Photoshop skills are demonstrated by opening, resizing, and cropping images, adjusting brightness and contrast, and saving files. Creating a new word processing document, inserting graphics into the document and saving the file in HTML demonstrate Microsoft Word skills.

Students select and sign up for either an Element of Art or Principle of Design (for example: point, simplicity, shape, clarity, space, balance, light, harmony). They take at least 12 pictures with a regular camera that illustrates their concept. Digital cameras are not used because scanning is one of the objectives for this project. They have the pictures developed, then scan and enhance them in Adobe Photoshop by resizing, cropping and adjusting brightness and contrast. Students also research their topic by interviewing art educators, and reading information both online and print-based. Finally they find at least two examples of the element/principle illustrated in artwork in online museums.

The students write a summary about their topic in a word processing program, inserting the pictures in the appropriate places. They are required to have at least 3 bibliographic references and a short annotation describing the instance of the element/principle in a piece of artwork in an online museum with a hyperlink to the site. Finally the documents are saved in HTML format so they can be shared with others.

Project 2: Creating a 3 Dimensional Timeline

In the second project, students contribute to a timeline of computer history and construct a three dimensional "virtual exhibit." Each student chooses a period of time based on important events in computer history such as "The Enigma Machine (1935)" or "Blaise Pascal: Pascaline Calculator (1642)." Then they create an exhibit in an online computer history museum. Supporting information about the life and times of that era must also be represented. Timelines are appropriate topics for this project because they have long been used to represent temporal information in visual form.

Figure 2: Example of Exhibit for Early Calculating Machines, Charles Babbage

Students demonstrate competencies in graphics skills such as understanding perspective and how to create an illusion of 3-dimension space, but they also must decide which images are

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needed in the space they create. Students research their era to find appropriate and meaningful historical and computer information. They must evaluate primarily textual information and then determine how it might best be presented visually. Students explore innovative approaches for displaying the visual information for the time period including techniques in color, light, and shadow. Finally students must obtain copyright permission to use any image not in the public domain or one they didn't create. The 3-dimensional room is placed on a Web page and the student submits information about the images, as well as links to relevant web sites that directly pertain to the computer history of that era.

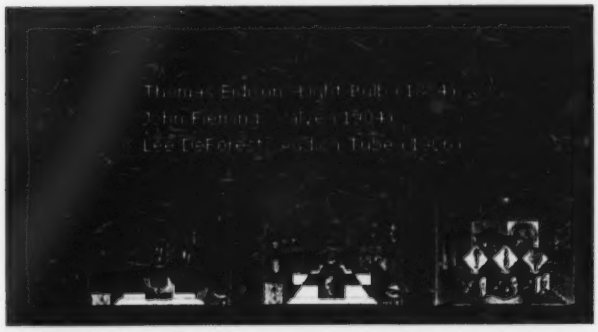

Figure 3: Part of the Menu for the Computer History Museum Showing Clickable Thumbnails for the Exhibits

As each class has contributed rooms to the Computer History Museum, it has continued to grow. Each room is shown on a menu page grouped with thumbnails of the rooms of each particular era. The thumbnail links to a Web page with a larger image and information about the era, important personalities, Web links, and information about the student who created the room.

Each room is very different since students have considerable freedom in selecting and placing objects and images. Usually the greatest limitation that students have to outcome is the lack of graphic software skills, since many students do not yet have the ability of reproduce what they see in their mind's eye.

Project Three: The Visual Representation of Statistical Data

For the third project, students design two visual representations of statistical educational data. Students create two graphs, one in normal form such as a bar graph, pie chart, or line graph, and the other using an innovative and less formal approach to portraying that same information. Both graphs reflect professionalism in design, but are radically different in both appearance and purpose.

Figure 4: Example of an Informal Graph

Each graph should reflect a well-planned layout; have consistency in type, appropriate sizing, and a balance of graphics and information. Supporting information about the data - the original source - must also be included. Students design the first graph for a formal publication such as a journal or professional publication. The other graph is designed for a less formal situation such as a presentation at a conference, in which the visual must be more colorful, interesting and compelling.

Although constructing a graph seems simple, graphs are much more complex and powerful tools of persuasion than many other visuals because they contain data that carries with it the perception of research and fact. A good graph portrays correct information, gives the reader information at a glance, demonstrates simplicity of design, and uses color to create emphasis and understanding.

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Project Four: Educational Animated GIF

In the fourth project, students construct an animated GIF that teaches an educational concept and demonstrates information in a purely visual manner. The image must show the represented data in a new, innovative and creative way. The animated GIF must be drawn be the student, but objects used in the animation may be from other sources such as scanned from a book or saved from the Web. The bibliographic source for the image, however, must be noted in full, and submitted with this project.

The most difficult part of this project is to narrow the topic down to a simple and straightforward subject that will easy to break into pieces or scenes in the process. Adobe ImageReady software is used to create the GIF, and build on the Photoshop skills already acquired in the previous projects.

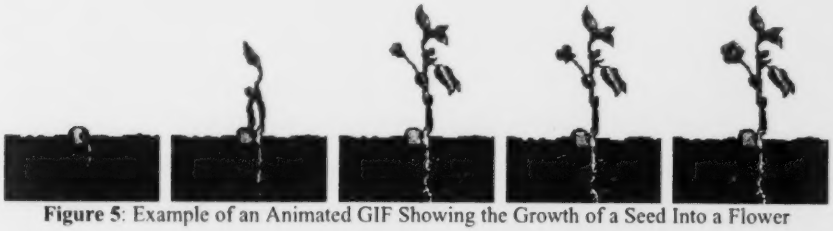

Figure 5: Example of an Animated GIF Showing the Growth of a Seed Into a Flower

Project Five: Interface Design

For the fifth and final project, students must design and build a consistent and meaningful interface for an educational computer-based program. All images and graphics used must be created, photographed, drawn, or scanned from natural objects; no clip art or scans may be used.

The components required for this project include a text-based design document that includes a design analysis, justification for the content and form of information representation, and identification of users. A flowchart that shows where screens fit into the total package must also be included. The visual elements include a collage that combines at least 5 images into a new representation, a tiled, seamless background, and navigational buttons that are consistent with the interface. Students develop five screens including a title screen, a menu screen, two content screens that branch from the menu, and a directions or help screen.

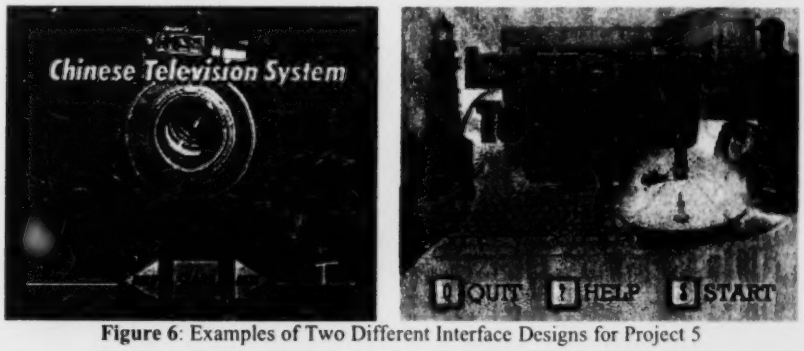

Figure 6: Examples of Two Different Interface Designs for Project 5

Many students note that this project is their favorite.

> *My favorite project was the final interface project. I liked it because I had to think in terms of an overall delivery system. It was challenging and the requirement that all of the graphics be our own forced me to be more creative.*

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Issues

Copyright

Many students wrestle with the issues of copyright. Because Project 2 will be shared with the Web community, students must obtain copyright permission for every image they use in their museum exhibit that is not in the public domain or they did not create. This is a difficult and often time-consuming task, but most students note that the process is worthwhile.

One student noted:

> *I really appreciated participating in the process of obtaining permission. If nothing else, you get to see the turn around time required for producing pieces..."*

Making Informed Design Decisions

Because they are making judgments and decisions in new contexts and situations, students deliberate and worry about the selection of topics and then the selection of images, especially in Project 2, the Computer History exhibit, and Project 3, Graphing Statistical Data.

One student stated:

> *The hardest one is project 2, showroom. You have to rely on other people's permission and it is quite difficult to find exactly the things you want.*

Evaluation Matrixes

For each project, students collaboratively developed an evaluation matrix. Working in small groups, students develop guidelines for each aspect of the design and submit those for approval to the entire class. Categories for the Project 2 matrix included such headings are "Value of Specific Computer Information," "Creativity, Originality and Innovative Approaches to Displaying Information," and "Illusion of Depth and Space." After completing each project, students first evaluate their own projects before submitting both the project and their evaluation. Students did not enjoy spending the time to construct the matrix for each project, but most felt the experience was worthwhile.

A student stated:

> *It (Constructing the matrixes) was the most difficult part of this course for me and i hated it. But when I look back at it now, I find that effort very useful because the effort of constructing matrixes taught me a lot of things about each subject matter and guided me through my projects.*

Portfolios

Students are also required to develop a portfolio of their projects. The portfolio includes each project and any supporting materials, such as an artist's statement. The portfolio has been useful for job interviews, referencing materials used in class, and documenting progress in the course.

Although the course is challenging, the rewards for both instructor and students are great. In addition to acquiring software skills, students noted growth in other areas, noting, "when you create something with your own materials, or you depend on your own thoughts and materials you feel more confident" and "I enjoyed the freedom of not being 'locked in' to a particular idea; to scrap one idea for another and devote the time necessary to finish it on time."

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